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ARCHIVES OF OPHTHALMOLOGY.

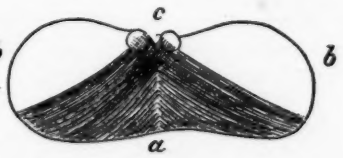
A CASE OF RECOVERY FROM AN AFFECTION OF THE CHIASM, WITH REMARKS ON THE LOCATION OF THE OPTIC-NERVE FIBRES IN THE CHIASM.

By Dr. SEGGEL, Munich.

(*With twenty charts of the visual field on Plates III.–VI. of Vol. XL., German Edition, and one diagram in the text.*)

Slightly Abridged Translation by Dr. Ward A. Holden.

THE relative location of the different optic-nerve fibres in the chiasm is still a matter of discussion, although it is generally conceded that the bulk of the crossed fibres lies in the medio-ventral portion of the opposite half of the chiasm, while the uncrossed fibres run in the dorso-lateral portion of the corresponding half of the chiasm. It is probable also that the papillo-macular bundle lies medio-dorsal just beneath the recessus opticus of the third ventricle, and here undergoes a partial crossing. The location of the fibres in a frontal section of the posterior portion of the chiasm is that shown in the diagram. A sagittal section through the middle of the chiasm would involve crossed fibres only. At the anterior and posterior angles of the chiasm crossed fibres predominate or are exclusively found, whereas uncrossed fibres run at the lateral angles.



Therefore, bitemporal hemianopsia will be found:

1. When the chiasm is divided in a sagittal direction, as in Nicati's experiments on cats and in Weir Mitchell's case;

2. When there is pressure on the anterior or posterior angle; and

3. When there is pressure on the lower surface of the chiasm.

The former view, that compression of the chiasm from below causes blindness in the upper halves of the fields of vision, is therefore no longer tenable. Lesions of the lower portion of the chiasm would cause, as the diagram shows, bitemporal hemianopsia; pressure from above, particularly if near the middle of the chiasm, would affect the papillo-macular bundle of each side.

The two cases to be recorded will serve to support these assumptions. In regard to the first case, I would remark in advance that in cases of bitemporal hemianopsia there need not be a sharp line of demarcation between the two halves of the field, as in cases of homonymous hemianopsia. Pressure from a tumor or an inflammatory process upon one angle of the chiasm or upon its lower surface will always cause an irregular line of limitation of the field, which in part advances beyond the median vertical line and in part remains behind it. Furthermore, since the adjacent bundles are involved in diminishing degree, there will be gradations in the visual field ranging from perfect perception to complete loss of perception. When the pressure acts from below, the uncrossed bundles will always be somewhat involved, since they lie laterally near the base of the chiasm. Furthermore, the crossed and uncrossed bundles are not so sharply separated in the chiasm that an accurate separation of them with involvement of one or the other exclusively can be conceived. Only when the chiasm is divided sagittally does a pure hemianopsia appear, with a sharp line of demarcation.

My first case, which is of particular interest an account of the favorable outcome, is as follows:

L. S., aged twenty-eight, a clerk, consulted me on April 10, 1893, complaining of diplopia and a limitation of vision outward, particularly to the left, which had existed for a year and a half and annoyed him, especially in writing. His father died of heart disease, his mother is living, and no pathological changes were found in the internal organs or the vascular system.

R v = $\frac{5}{15}$ and Jaeger 2; L v = $\frac{5}{60}$ and Jaeger 19 with difficulty. The left eye squints outward slightly, and its mobility inward is

reduced. Previously there had been diplopia, but with the reduced vision in the left eye diplopia could not be produced even with a red glass. There had undoubtedly been a paresis of the right internal rectus. The pupils were equal and reacted normally. With the ophthalmoscope, both eyes were found to be emmetropic. The left disc was somewhat paler than the right. There was no disturbance of smell and no other abnormalities of the nervous system. No signs of syphilis could be found.

Examination of the field of vision (Figs. 1 and 2) showed in both temporal halves, besides an absolute peripheric defect, a larger temporal hemianopic defect, in the periphery of which a white test-object appeared gray and in the centre (cross-hatched in the figure) was not perceived at all. The margin of the defect in the field of the right eye coincided with the middle line, but in the field of the left the scotoma extended 8° beyond the median line into the nasal half, the vision in this eye being greatly reduced.

While a crescentic area remains for the perception of white in the temporal halves of the fields, the temporal hemianopsia for colors is complete. There is, therefore, a partial hemianopsia for light perception and total for color. The nasal halves of the fields are not altogether complete, there being slight concentric contraction more marked in the left eye.

Because of the pronounced temporal hemianopsia, which is found in half the cases of affection of the chiasm, and because of the absence of accompanying symptoms which would indicate a cerebral location, it was concluded that we had to do with a lesion of the chiasm, and, in accordance with the views then prevalent, of an affection of its anterior or posterior angle. Since smell was unaffected and there was a paralysis of the oculo-motor nerve on the left side, that of the greater visual affection, it seemed rational to believe that the posterior portion of the chiasm was affected. The nature of the affection, however, since syphilis could be excluded, was difficult to determine.

In 93 cases of chiasm disease hitherto recorded there was trauma in 7, tumor in 27 (of the hypophysis 10 times and at the chiasm proper 4 times), tuberculous exudation or granulations in 6, aneurysm of the carotid or basilar artery in 4, pressure from the third ventricle in 3, periostitis in 2, par-

tial meningitis in 4, gummous basilar meningitis and syphilitic disease of the chiasm itself in 16, gummous arteritis in 1, hemorrhage into the chiasm in 1, multiple sclerosis in 1, and hyperplasia from elephantiasis in 1. Among the tumors were 6 sarcomas, 2 gummas, 1 glioma, 1 endothelioma, 1 adeno-carcinoma, and 1 enchondroma. Syphilitic processes were present in 19 cases, or 20 per cent.

In my case one naturally thought of tumor or a circumscribed basilar meningitis, but since there were no other symptoms of acromegaly I resolved to treat the case as if it were of an inflammatory nature by attention to the bowels, stimulating foot-baths, and 1 gramme of iodide of potassium daily.

The results of this treatment were successful beyond expectation although the improvement in vision was slow. In a week the vision of the right eye had risen from $\frac{5}{15}$ to $\frac{6}{8}$, of the left from $\frac{5}{60}$ to $\frac{6}{30}$. The inner defect in the temporal halves of the fields (Figs. 3 and 4) had become somewhat smaller and had, in the left eye, retracted from the middle line. The limitation of the periphery of the field remained unchanged. Three weeks later the improvement was more marked. Color perception in the temporal halves of the field (Figs. 5 and 6) was more extended, and there remained only a small triangular relative defect. The peripheric limitation had almost disappeared in the right eye, and only a narrow zone remained in the left. Vision was now R $\frac{6}{8}$, L $\frac{6}{10}$.

Six weeks later the absolute defects had disappeared and there now remained in each field a paracentral relative scotoma only. Vision in each eye was $\frac{6}{8}$. The limitation of mobility in the left eye no longer remained, and there was no diplopia. The patient then decided to give up treatment but appeared 15 months later on account of a new decrease in vision and occasional diplopia as well as a dull pain in the occipital region. The last symptom, which has been wanting before, seemed to confirm the idea of an inflammation.

Vision was now R $\frac{5}{5}$, L $\frac{3}{5}$; with the perimeter there was found an extensive defect in each temporal field (Figs. 9 and 10), differing from the earlier defects in that it occupied the

greater portion of the temporal field, extending inward from the periphery, and involving also portions of the nasal field. The defects were not sharply limited, but near the margins were zones of relative loss of vision.

Three weeks later the pain in the occiput had ceased and vision was R $\frac{5}{8}$, L $\frac{4}{8}$. The temporal half of the left disc appeared pale. The fields of vision (Figs. 10 and 12) had changed somewhat in form, but little in extent.

Two weeks later, the patient still feeling well, the limits of the defect in the right eye had receded somewhat from the middle line. In the left field there was a slight increase of the defect (Fig. 14) and vision had sunk from $\frac{4}{8}$ to $\frac{3}{8}$.

After the patient had been kept seven weeks in the hospital under treatment with iodide of potassium the defects decreased in size (Figs. 15 and 16), beginning near the centre. This was more noticeable seven weeks later (Figs. 17 and 18).

Three months later another examination showed the field of the right eye to be normal and the left to have only a narrow peripheric defect (Figs. 19 and 20), and the limits of the color fields had regained their normal position.

The acuteness of central vision did not improve in the same degree, that of the right eye having risen to $\frac{5}{8}$ and that of the left to $\frac{4}{12}$. The entire left disc now appears discolored and the lamina cribrosa visible.

The patient's condition has continued to be good, as I have been informed recently by letter.

If we glance over the history of the case again, the essential features appear to be as follows: In the beginning there was a partial paracentral defect, partly relative, partly absolute, in both temporal halves of the fields; on the right side extending to the median line, on the left passing somewhat beyond the middle line. Besides these defects there was a peripheric limitation which extended from above over upon the nasal halves of the field, and between the two was left a crescent that was relatively free. Under the use of iodide of potassium the defects diminished to a small relative scotoma and a slight peripheric limitation above.

Fifteen months later there was a relapse with an almost

complete loss of the temporal halves of the fields. As improvement began, the free crescent appeared again between the paracentral and the peripheric defects, as in the first attack; but the complete disappearance of the defects came about through a clearing up from the centre toward the periphery and not through an enlargement of the free crescent. Finally there was complete restitutio ad integrum, except for the diminution of central vision in the left eye due to an involvement of the papillo-macular bundle. The fact that the papillo-macular bundle lying in the dorsal portion of the chiasm should have suffered, while the basal bundles which were more directly affected had regained their function after two or three months, is surprising, yet it was doubtless due to the greater delicacy of the papillo-macular fibres; and the fact that this bundle was more affected in the left eye may be explained by supposing that the basal inflammation was more extensive and severe on the left side, as the left oculomotor paralysis would indicate.

The entire process may be explained by supposing pressure to have been exerted on the lower portion of the chiasm if we conceive the fibre bundles to be arranged as shown in the diagram.

A second case to which I wish to refer has been reported by Dr. Seydel.

An engineer, aged forty-seven, had been struck on the head fifteen years before. He did not lose consciousness at once, but the next day he became unconscious and continued so for several weeks. Five years ago he began to have remittent headache, which became constant, and later there was paralysis of the right half of the body. Later he became dizzy and there was twitching of the paretic extremities with apathy, increased headache, etc.

There was no disturbance of sensibility. I was called in to see whether an ophthalmoscopic examination would throw any light upon the nature of the affection, which was located in the upper portion of the left central convolution.

Nov. 4, 1895.—I found right papillitis of moderate degree with $v = \frac{2}{3}$. On the left side there was no choked disc, but on the contrary a pale disc, with $v = \frac{1}{8}$–$\frac{1}{5}$. The right choked disc seemed to confirm the diagnosis of tumor at the point indi-

cated. Since syphilis could not be definitely excluded and there was a possibility of the tumor being a gumma, iodide of potassium was tried, but the brain symptoms grew worse, the papillitis increased, and the vision diminished to R v = $\frac{1}{3}$, L v = fingers at $\frac{1}{8}$ *m*. There was a pronounced central scotoma which could not be mapped out definitely because of the mental hebetude of the patient. From the latter fact I concluded that there was internal hydrocephalus, and that through the recessus opticus, which is in connection with the third and the lateral ventricles, pressure was exerted upon the left papillo-macular bundle.

The evidences of pressure on the chiasm seemed to me an indication for operative removal of the tumor if blindness was to be prevented. Dr. Seydel then removed a fibroma of the dura mater, as large as a cherry-stone, from the point at which the tumor had been located clinically.

Nine days after the operation the right papillitis had receded and vision had improved from $\frac{1}{8}$ to $\frac{1}{4}$. A month later R v = $\frac{6}{6}$ with + 2.75, and Jaeger 3 was read fluently. The visual and the color fields were normal. Left eye: a central, obliquely oval, absolute scotoma extending 10° upward and downward, nasally 15° and temporally 18°, thus including the blind spot; the scotoma thus corresponds accurately to the location of the papillo-macular bundle, including a narrow crescentic area bordering the macula at its nasal, upper, and lower margins. Fingers and colored discs were recognized at $\frac{1}{3}$ *m* distance. Ophthalmoscopically: refraction + 2. D, a white, sharply outlined disc, without contraction of the vessels.

I have said elsewhere that unilateral papillitis is a rare condition, and it is noteworthy that in this case, after removal of the tumor, the papillitis completely disappeared. It is, however, of greater interest that in the left eye, the tumor being situated on this side, there had been no papillitis, this being excluded by the white discoloration of the disc and its sharp outlines, while the atrophy limited to the papillo-macular bundle suggested the dorso-medial location of this bundle in the chiasm. It does not appear to me to be accidental, furthermore, that on the left side, where the pressure of the dilated recessus opticus had affected the upper half of the chiasm, there was no choked disc, while the choked disc was pronounced on the right side. It would

seem that the pressure from above had been exerted upon the left optic nerve or its sheaths and thus destroyed the communication with the subdural space. This furnishes a further line in the chain of proof that the papillo-macular bundle lies medio-dorsal in the chiasm, since the vision of the right eye had suffered temporarily, and disproportionately to the ophthalmoscopic picture of the papillitis.

CASE OF INTERSTITIAL KERATITIS CUT SHORT BY ATTACK OF MEASLES.

By HERBERT HARLAN, A.M., M.D., Baltimore, Md.

In February, 1900, G. B., æt. nine, was admitted to the wards of the Presbyterian Eye, Ear, and Throat Charity Hospital of Baltimore. He came from one of the counties of the Eastern Shore. He had a severe case of interstitial keratitis. Both corneæ were vascular. No iris could be seen. He had only light perception, and there was the usual photophobia. He had to be led about the ward, and spent most of his time with his head buried in a pillow. He had the peculiarly shaped head and the notched teeth that we associate with inherited syphilis. To his father was given the prognosis that it would be several months before he would begin slowly to regain his sight. He was put upon the ordinary routine treatment for such cases, namely, atropia locally, and tonics and alteratives containing mercury internally. After about three weeks there was no appreciable improvement, and one day he was found to be ailing and two days later was found to be broken out with the eruption of measles. This occurred on Friday morning. He had a rather bad case, and for a couple of days was very sick. The Monday morning following, when he was better of his measles, his eyes were also found to be greatly improved. He could see for the first time all the objects about the ward. The redness of the sclera and the vascularity of the cornea were all gone. The pupils could be seen and were well dilated. There still remained some central clouds, which prevented his having good vision. But he had made as much progress toward recovery in three days as I have ever seen occur in a similar case in as many months. His tonic alterative treatment was continued, and he was sent to his home in the country. He returned on July 18th, and reported that he had been doing well and that his sight was still improving. It was then $\frac{15}{100}$ in each eye.

TWO CASES OF STEEL IN EYE: THE FIRST REMOVED BY MAGNET, EYE SAVED, WITH CATARACT FORMATION; THE SECOND REMAINING QUIET IN THE BACKGROUND OF A HEALTHY EYE.

By Dr. J. H. DELANY,

OCULIST AND AURIST TO ST. VINCENT'S HOSPITAL, ERIE, PA.

May 15, 1900.—C. M. while at work this morning in a shop was struck in right eye by a piece of steel, and seen at my office about half an hour later. Examination at this time showed that the steel struck the eye about the centre of the cornea, passed straight through the lens and lodged in the choroid, just to the temporal side of the optic nerve, as could be plainly seen by the ophthalmoscope, the media still being clear. As it was out of the question to extract the steel through its passage, I made an incision through the upper and posterior part of the sclera and introduced a magnet *after first thoroughly disinfecting the magnet tip in bichloride solution.* At first touch the steel was caught and brought to the opening in the sclera, but it was of such a shape that it would not pass through the incision made, and while endeavoring to extract it with some force or have it lodge in the opening it dropped from the magnet. Some vitreous was escaping but not enough to be alarming. I made another examination with the ophthalmoscope with a view of locating the foreign body again. There was at this time considerable blood in the vitreous and the lens becoming opaque, but I could still see the nerve and retinal vessels and discovered the steel below and about the centre of the globe. I enlarged the opening in the sclera and prepared my magnet as before; this time I succeeded in extracting it without difficulty. The wound in sclera was closed by three sutures, a bandage applied, and the patient sent to hospital to remain quiet in

bed. On examination next day I found the corneal wound nearly closed, normal anterior chamber, some congestion of the iris, and lens nearly opaque, so much so that I could not see the fundus; good perception of light. Eye washed in a solution of bichloride 1 to 5000. Atropine used and bandage reapplied. May 17th: dressed the eye, found corneal wound closed, and that in the sclera nearly so. Tension — 2 (we would expect this from the vitreous that escaped). Removed two of the sutures from the sclera and bandaged as before. May 18th: eye continues doing well; removed other sutures, lens entirely opaque, wound in cornea healed, pupil well dilated and congestion of iris improved; good light perception. May 24th: left hospital cured; refuses to have the cataract removed at present.

There is one thing connected with these operations which it is very important to observe—*i. e.*, thorough antisepsis of the magnet tip. Have the patient prepared for the operation before you take the magnet from the antiseptic solution; in this way you will expose it to the air as little as possible before inserting it into the eye. In many of these cases the steel is innocuous when it enters the eye and I am inclined to think that inflammation or suppuration is caused more by lack of antiseptic precaution than by the steel.

My record book shows a case of three years' standing where a man was struck by a piece of steel which had passed through the upper lid, down through the eyeball, lodging in the choroid below the nerve. I did not see this case until the third day after he was struck, when he came to my office on account of swelling of the lid. Examination: Wound in sclera entirely healed, media clear, steel plainly seen below the nerve. Everything connected with the eye was quiet; vision not impaired. I did not attempt to remove the steel in this case and up to this time the vision remains perfect. I also have notes of a similar case seen while assistant to Dr. Knapp at the New York Ophthalmic and Aural Institute in the spring of 1891.

CONGENITAL RIGHT-SIDED ANOPHTHALMUS WITH LEFT-SIDED MICROPHTHALMUS.

By L. D. BROSE, M.D., Ph.D.,

OCULIST AND AURIST TO ST. MARY'S HOSPITAL, EVANSVILLE, IND.

I use the word anophthalmus as meaning that no eyeball could be seen or felt in the right orbital cavity, rather than that the eye was absolutely wanting, a condition that only a most careful dissection could determine. My patient, a well-nourished five-day-old female, and first-born to Mr. and Mrs. F. H. C., young people between twenty and twenty-five, was sent to me April 19, 1900, by Dr. Sarah Buxton, of Rockport, Ind. The nurse who brought the infant stated that the mother had always enjoyed good health, and had had an easy labor. The mother connects the infant's defective eyes with mental impression during her second month of pregnancy, occasioned through being shocked on seeing the face of a relative's dead child. The dead child's features, however, presented nothing abnormal. By questioning the husband I learned that the paternal grandfather of his child was born without a right eye, while with his left eye he saw perfectly. He was the father of five children, all of whom had good sight, nor had any of them an abnormality. Because of the small intermarginal lid space, and the small and very tense eyelids, the edges of which were somewhat inverted, an examination of the orbital cavities was attended with difficulty. With the aid of a small retractor the lids were separated sufficiently to determine that the left globe was present in a highly microphthalmic condition, but not a trace of the right globe was found. The eyebrows, eyelashes, and tear-ducts were regularly formed, and the child was wholly without other malformation. It was directed that the child be brought to me again in two months, and so, June 29th, the mother came with it, when a double external canthotomy was

made, permitting a more thorough examination of the orbital contents. The right conjunctival sac was perfectly developed, but the eye itself was missing. The small rudimentary eye in the left orbit, possibly as large as a big pea, had a small transparent cornea, through which an iris was detected by its bluish color. It lacked a pupil formation, and if the lens was present, judging from the size of the eye, it must be extremely small. The presence or absence of the external eye muscles could not be accurately determined, but from the perfect development of the orbital tissues outside of the eyeball I inferred they were. Cystic formation was absent on both sides.

The pathogenesis of the anomaly of lack of formation of an eye is still in dispute, notwithstanding more than fifty cases have been reported, in not a few of which careful dissections were made, supplemented in a number of instances by careful histological examination by competent observers. Those cases in which heredity is demonstrated, in my opinion, are best explained by the total want of development of the primary optic vesicle, or later by the incomplete formation of the secondary optic vesicle.

OPHTHALMIC CURIOSITIES. TWO CASES.

I.—PROPTOSIS BY GENTLY OPENING THE EYE WITH THE FINGERS. II. — HEALING OF AN EXTENSIVE WOUND THROUGH CORNEA AND SCLERA.

By Dr. GEORGE STRAWBRIDGE, Philadelphia.

Case I.—**Forward Dislocation of Eyeball by gently Opening the Lids with the Fingers.**

Mrs. C. H., colored, æt. twenty-six, well-developed, healthy woman, was struck on the right temporal region a short time before date of consultation, causing great pain for a week. At time of visit she complained of dimness of vision. R, V = $\frac{5}{12}$; L, V = $\frac{6}{30}$. Otherwise eyes were free from pain or discomfort; no trace of previous injury. Eyeballs somewhat prominent.

While gently opening the lids with the thumb and forefinger for inspection of right eyeball, I was astonished to see the eye suddenly project itself out of its orbit, while the lids closed in behind it and so firmly held the eye in this, to me, entirely novel position. I had no difficulty in reducing the dislocation by pressure with fingers and thumb on the eyeball, the thumb and fingers of the other hand holding the eyelids widely apart. The eye went back with a snap. The woman was greatly alarmed and had to be held during the replacement. The eye-ground was examined immediately and found to be entirely normal. Three days later she was seen and a moderate myopic astigmatism of both eyes was corrected, with resulting normal vision. The right eye was free of irritation.

In a practice of over thirty years, embracing many thousands of cases, I have had no similar experience, and find no such case recorded by other writers. I account for it by

supposing the bony orbital edge to have been poorly developed and the soft orbital tissues unduly loose, so that lid pressure alone kept the eye in position. This being removed the eyeball projected itself into this new position.

CASE II.—**Healing of an Extensive Wound through Cornea and Sclera.**

Male patient, æt. forty-seven, a foreman in the Philadelphia fire service. While climbing up a ladder placed against a burning building and looking up as he climbed, was struck (probably by a piece of glass from a window pane) in left eye.

The wound started above the centre of cornea and proceeded from thence downward and inward through ciliary body into sclera a distance of six *mm.* The entire wound length measured fourteen *mm.* When seen the eyeball was collapsed, having lost at least one half of its contents; the iris was entangled in the wound with some blood in anterior chamber. Vision, movement of fingers. As the cut was a clean one and presented no evidence of suppuration it was considered justifiable to delay enucleation and allow nature to attempt union of the wound.

The patient was placed on his back in bed and ice-cold pads kept on eyeball for ten days, atropia being used locally and bowels thoroughly moved. Very moderate reaction was present and no suppuration whatever.

A few days after the accident a cystic growth appeared in the corneal part of wound, no doubt caused by the aqueous fluid pressing on the newly forming cicatricial tissue; later on this was excised. A light bandage replaced the ice pads after the tenth day, atropia still being continued and patient allowed to walk about. A few days later a cellulose eye-shade was substituted for the bandage and finally a medium blue coquille-glass was sufficient protection.

Status præsens: Seven weeks after accident in left eye very little irritation; pupil vertically oblong, caused by iris adherence to corneal wound. Entire cut cicatrizing rapidly. Vision $= \frac{6}{30}$. Right eye normal.

Some years ago while experimenting on the eyes of live rabbits I made a number of circular openings with a small trephine run by a dental engine, through the scleral coat of the eyeball, also several openings through the ciliary part of the eyeball, and found the latter to preserve their entirety

as well as the scleral openings, and no especial eyeball reaction was noticed in any of the cases. I then concluded that the dictum, that ciliary injuries practically meant enucleation of the eyeball, should exclude those cases where the injury showed a clean cut free of septic material.

Later on I saw a case in consultation where the eyeball was cut in its ciliary part by a piece of glass. The wound healed without complication and full sight was preserved.

I have seen recently an eyeball which suffered many years previously from an incision across the entire front of the ball including ciliary body. At the present time this eye is entirely free from irritation and has been in this condition for a long time, although only light perception exists, but as the lens is opaque the vision could be, no doubt, much improved by its removal.

It is always to be borne in mind that the risk of sympathetic inflammation should preclude any effort to save eyeballs with this class of injuries as soon as symptoms of irido-cyclitis make their appearance. Such cases ought, of course, to be carefully watched.

AUTOPSY REPORT OF A CASE OF CONGENITAL UNILATERAL ANOPHTHALMUS.

By Dr. C. ZIMMERMANN, Milwaukee, Wis.

SINCE my previous paper on "Congenital Unilateral Anophthalmus," published in these ARCHIVES, vol. xxii., page 340, 1893, in which I described the clinical history of this case, may not be accessible to every reader, I give herewith an abstract of it:

"F. K., a robust man, thirty-three years old, six feet one inch high, weighing two hundred and twenty-seven pounds, is perfectly intelligent. He is the third child of healthy parents (not consanguineous), and neither these nor his sisters and brothers suffered from any malformations. The right eye is perfectly normal. The left eyeball is wanting. Its adnexa are in their normal place and all developed, but of diminished size. The lids are smaller, the upper one slightly entropic with its ciliary margin touching the lower one, which is a little ectropic. The palpebral fissure is 2 *cm* long (in right eye 3.5 *cm*). Caruncle, lachrymal points, and lachrymal gland are there, tears flowing from the eye just as from its fellow on irritation. After insertion of lid-retractors a diminished empty conjunctival sac is exposed, in the depth of which no trace of an eyeball can be seen or felt. The finger finds a soft cushion, feeling as the contents of the orbit do after enucleation. The conjunctiva at the bottom of the sac looks a little whitish from the underlying Tenon's capsule. The presence of the ocular muscles becomes evident by their action, as the sac moves in all directions in association with the other eye. Neither pressure nor the faradic current creates any sensation of light, so that absence or degeneration of the optic nerve may be inferred. The left orbit is considerably smaller than the right.

The height at the supraorbital foramen: L, 2 *cm*; R, 3 *cm*. Greatest horizontal width: L, 3 *cm*; R, 4 *cm*. Left eyebrow 5 *cm* long; R, 6.5 *cm*.

"The skull is asymmetric, the left portion of face and forehead being smaller than the right. The left side of the forehead is receding as well as the hair on this side. The following measures were taken with the compass: Longitudinal diameter (root of nose to occipital protuberance), 18 *cm*. Root of nose to tuberculum radicis arcus zygomatici (above and behind the ear) L, 12 *cm*; R 12.5 *cm*. The width between both ears, *i. e.*, between the above-mentioned tubercula, 15 *cm*. Width between both tubera parietalia, 16 *cm*. Distance of external walls of both orbits 10 *cm*. Figures obtained with tape measure: Horizontal circumference of head, taken from centre between both arcus superciliares to occipital protuberance, 56 *cm*. The left (pathological) half of it measures 29 *cm*, the right only 27 *cm*, the left parietal bone showing a greater extension than the right, compensating for the diminished size of the left side of the forehead. Root of nose to the external wall of left orbit 6 *cm*; of right orbit 7 *cm*. Frontal arch between the roots of both arcus zygomatici, 32.5 *cm*. The patient has a cranium progenæum, the lower jaw forming an overbite over the superior maxillary. The palatal vault is very high and narrow. The left superior maxillary is smaller than the right and has one tooth, the canine, less that the right. The posterior wall of the pharynx projects more on the right than on the left side. In posterior rhinoscopy the left choana appears to be smaller than the right. The deviation of the nasal septum to the right in front is due to a fracture he suffered when fifteen years old.

"The left auricle also shows a deformity. Its lobe is rudimentary, and the whole auricle looks as if it had been rolled up in a forward direction and drawn forward. Its posterior aspect nearly forms a plane, without bends and elevations, and stands out at a right angle with the head, so that the anterior limit of the helix lies in one frontal plane with the posterior wall of the external ear opening. In a profile view it seems to cover half of the concha. In the skin, 0.75 *cm* in front of the tragus, is an elevated scar 1 *cm* long (vertical diameter) and 0.56 *cm* wide (sagittal diameter), where, according to the patient's statement, the auricle was attatched at birth and was severed by operation soon afterwards. A small scar at the posterior surface of the helix corresponds

exactly to that place. When the auricle is rolled forward, both scars touch each other. After the inspissated cerumen was removed, the auditory canal and *Mt* appear perfectly normal, as well as the hearing power, so that the malformation of the hearing organ is limited to the auricle. There is no other asymmetry, except that the left foot is thicker than the right.

"The story the parents gave in this case was this: The boy was born in a position in which he held his left hand on the left eye, pulling the left auricle forward with his fingers. The eye was wanting, and the ear was firmly attached to the head. The left leg was drawn upward and, when stretched, tended to return to that position, so that it had to be fixed in splints. Manz (*Graefe-Saëmisch*, ii., p. 125), in quoting a similar, if not the same, case of Hoederath, seems to consider the anophthalmus to be of traumatic origin, caused by the pressure of the hand, leaving it undecided whether the peculiar position of the arm may have been due to a constriction by amniotic threads or the umbilical cord. If this had been the case, the constriction must have been very firm, so that we would expect to find some traces of it on the arm or hand, an atrophic spot or a scar, or some other malformation, but there was nothing of the kind. As not only the eye and ear, which alone might have suffered from the pressure of the hand, but even the whole left side of the head were defective, this factor loses its value as the only cause of the malformation. The child's condition at birth not having been communicated by an expert, we are not allowed to adopt at once the parents' pretty vague narration and base theories on it. The father told me that at first they thought the midwife had injured the eye and had invented that story for her exculpation. Apparently he had not seen the asserted position, nor had the mother, as they at first tried to conceal from her the existence of such a deformity. The case, however, is of especial interest, as being one of those rare instances in which the anophthalmus was observed in an adult, and corroborating the assumption that this malformation was due to an arrest of development, with consequent destruction of the eyeball, in a pretty late period of fœtal life, when the eyeball was already developed, as we infer from the presence of its appendages, and not caused by a primary deficiency."

In March, 1897, the patient fell from the second story of his house, fractured his skull, and died the same day. The

next day I was present at the autopsy, performed by Drs. A. J. Burgess and Bryant Smith, to whom I am indebted for the protocol.

I here mention only the most important points: Scalp wound, two inches long, upon left side of head above the ear; contusion of scalp with effusion of blood surrounding the wound. Left eye absent; left ear abnormal in shape and small. Some clotted blood beneath pericranium. On left side a fracture of skull beginning at temporal ridge, extending downwards over parietal bone. Considerable effusion of serum in cranial cavity and some blood clots. Skull thick, asymmetrical. Internal osteophyte formatism, especially over the frontal region. The petrous bone two thirds size of the right. No anterior clinoid processes, posterior clinoid processes poorly developed, left smaller than right. Sella turcica oval transversely three eighths of an inch deep. Nerves: No trace of olfactory nerve and bulb of left side; right normal. Left optic nerve about one fifth size of right, which is normal. Right optic tract about one sixth smaller than left tract. Right oculomotor nerve normal, left one half size of right and presents an acute flexure backwards and forwards. Remaining nerves apparently normal. Blood-vessels: Right vertebral artery absent; left vertebral artery large. After dissection of the dura off from the base, a fracture of the latter is observed, beginning at insertion of temporal muscle of left side, extending downwards toward external auditory meatus, then turning forward and running inward along anterior border of petrous bone and greater wing of sphenoid to end in the foramen ovale. Brain of normal size, vessels normal. Vertical and horizontal incisions show nothing abnormal except rupture of one or two small vessels of choroid plexus, apparently the result of concussion of the brain consequent to fracture of skull. Slight atheroma of aorta, left coronary artery absent.

The roof of left orbit was chiselled away and the contents of the orbit removed. Following the optic nerve, which was reduced to a thin band, I dissected the contents of the orbit and found that it terminated in a small mass of fibrous tissue, just like the sclerotic, of the size of a pea, which showed in its interior a small amount of black pigment. This small mass was apparently the rudimentary eyeball containing only remnants of sclerotic and choroid.

The latest literature will be found in E. von Hippel's paper "On Congenital Anophthalmus" in *v. Graefe's Archiv*, vol. xlvii., page 227, and "Malformations and Congenital Anomalies of the Eye" in the new edition of *Graefe-Saemisch*. Von Hippel collected sixty-four cases of bilateral and twenty-three cases of unilateral anophthalmus, most of which corresponded clinically to our case. In some the post-mortem examination revealed no rudiments of an eyeball except a fibrous membrane covering the posterior surface of the conjunctiva. They can, however, not be considered as conclusive since they were not examined microscopically. In the more recent cases the histological examination regularly showed marked rudiments of a globe, except one, in which von Michel found a piece of hyaline cartilage at the apex of the conjunctival sac. No microscopic proof was required in our case, which in the tough fibrous tissue, pigmented in the interior, disclosed without doubt the rudiments of sclerotic and choroid.

Two theories are offered for the explanation of anophthalmus: Either the proton of the eyeball was not formed at all, or the eyeball, at first well developed, was destroyed by disease at a certain time of embryonic life. Von Hippel remarks that the few anatomical examinations demonstrate that the globes were destroyed by severe inflammatory, very likely purulent, processes, and the cases of so-called anophthalmus must be considered as the highest degree of fœtal phthisis bulbi. The autopsy confirmed the assumption, expressed in my first article, that this case was an illustration of such a destructive process of the eyeball at a rather late period of fœtal life, although we do not know from what cause. To elucidate this a microscopic and bacteriological examination was intended, as micro-organisms were to be expected if the affection damaging the eye had been purulent, but unfortunately the changes the specimen had undergone in the preservation fluids prevented sufficient recognition of details.

The degeneration of the left optic nerve and in the optic tracts, which was, of course, secondary, furnished an interesting observation as to the course of the optic fibres in

the chiasm. The fact that the optic nerves differed much more in size than the optic tracts was a proof in favor of semi-decussation of the optic fibres, since the proportion would have been the same if a total crossing had taken place, and the smaller size of the right (opposite) tract showed that the larger part of its fibres were crossed. If the smaller part crossed, and the larger part proceeded to the homolateral tract, the latter, *i. e.*, the left, would have been smaller than the right. If the crossed and homolateral bundles were equal, both tracts must have had the same size, as then each tract necessarily would have contained an equal normal and an equal degenerated bundle. The reduction of the left oculomotor nerve to half its volume probably was also due to secondary degeneration from diminished activity of the ocular muscles on that side. Corresponding to the deficient configuration of the left side of the surface of the skull was the interior, which, as well as the abnormal course of the left oculomotor nerve and the absence of left olfactory nerve and bulb, right vertebral, and left coronary arteries, must be considered as parallel defects frequently found associated with congenital anomalies of the eyeball, which may be of different etiology.

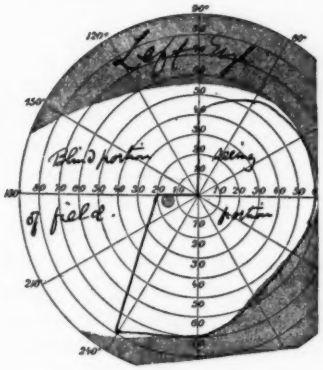
TWO CASES OF OSSIFICATION OF THE CHOROID.

(With a visual-field chart.)

By DAVID WEBSTER, M.D., New York.

Case 1.—**Atrophied eyeball containing bony plate; incomplete hemianopsia of the fellow eye.**

E. W. D., æt. eighteen, came to my clinic at the Manhattan Eye and Ear Hospital on September 10, 1888. His right eye had been injured with a penknife when he was three years old. It was shrunken to about one third the natural size. On the night before I saw him the atrophied eye had been painful for the first time. He had had an attack of inflammatory rheumatism in the preceding March, ever since which his field of vision had



been mostly cut off on the temporal side. It came near to being uniocular temporal hemianopsia, but the blind area encroached more upon the upper part of the visual field than upon the lower, as shown by the accompanying chart. His central vision was $\frac{20}{20}$

with + $\frac{1}{60}$ cyl. axis 180°. His accommodation was normal. Two days later, after a solution of sulphate of atropia had been dropped into his eye six times, his vision was $\frac{20}{15}$ with + $\frac{1}{48}$ cyl. axis 180°.

Ophthalmoscopic examination showed only a few small whitish spots scattered about the region of the macula. The patient was referred to the Nerve Department, and Dr. Swift reported that he could find no evidence of any central lesion to account for the cutting off of the temporal portion of the field. Enucleation of the atrophied bulb was advised on general principles and, with the consent of the patient, was performed on the same day. The sclera, on incision, was found to be thickened and tough, and there was a depression in it at each point of insertion of the tendons of the muscles. The choroid contained a bony plate which extended from the optic nerve to the ciliary region. The patient remained in the hospital and was given a daily hypodermic of nitrate of strychnia until September 26th,when he was discharged with no change in his field of vision. He was examined by the late Dr. E. C. Seguin, who recorded his opinion that the patient had "aortic and mitral lesions," and that the loss of vision was "probably due to embolism with capillary plugging of the nasal branch of the retinal artery." The visual field was taken on four different occasions, the last time on November 5th, and was always the same.

On reviewing this case it seems improbable that there was a sympathetic element in it. It was well for the patient, however, that the shrunken globe was enucleated, for the calcified plate found in it was liable to cause sympathetic trouble at any time, and possibly the loss of what sight remained to him. There can be little doubt that the blindness of the nasal portion of the retina was due to embolism, but it seems questionable whether there could be "capillary plugging of the nasal branch of the retinal artery" without any ophthalmoscopic evidence of the same. Why not better suppose an embolism in the cuneus or somewhere in the optical centres?

Case 2.—Phthisis bulbi with ossification of the choroid; enucleation for sympathetic irritation of fellow eye.

Annie G., æt. twenty-two, presented herself at the clinic on

October 19, 1900. She said that her right eye had been blind since she was eighteen months old, when an attack of inflammation had been followed by shrinking of the eyeball. Nevertheless, so far as she knew it never gave her any trouble. In the last few months she had begun to experience discomfort with her left eye. It was watery in the morning on waking; it was somewhat sensitive to light; it became tired quickly on use; and she had frequent headaches which seemed to "come from her eye." On examining the atrophied eyeball to determine whether any part of it was sensitive on pressure, I found that in certain areas it was peculiarly hard to the touch. I immediately suspected a bony choroid and told the patient so, and advised enucleation. There was no tenderness on pressure of either eye. The left eye had vision $\frac{20}{15}$, and a manifest hypermetropia of two and a half dioptries, and was ophthalmoscopically normal. Wearing the glasses correcting her manifest hypermetropia failed to relieve the symptoms of which she complained, and, on October 24th, she consented to have the shrunken globe removed. I enucleated the eye, under ether, and asked Dr. Edgar S. Thomson, one of the pathologists of the hospital, to examine it for me. The following is Dr. Thomson's report:

The eye, which measured 20 *mm* in its antero-posterior diameter, was hardened in formalin and bisected horizontally. The cornea was slightly thickened; the anterior chamber deep; the pupil contracted; the ciliary bodies atrophic; the lens calcareous; the retina totally detached in funnel-shape; and a large plate of bone in the choroid covered by the remains of the retinal pigment layer. This plate of bone lay on the nasal side and extended from the upper to nearly the lower end of the vertical axis, and from the ora serrata to within 2 *mm* of the optic nerve.

The specimen was decalcified and embedded in celloidin. Sections showed the cornea to be fairly normal. The iris was slightly atrophic and filled with pigment granules; the ciliary body shrunken and atrophic and thickly infiltrated with leucocytes, very little trace of the muscular structure remaining; and the retina, also infiltrated, showing very little trace of its original structure, being entirely transformed into connective tissue in places. Near the ora serrata the contraction bands in the retina had begun to tear the ciliary body from its attachment to the sclera. The

optic nerve was atrophic. The choroidal pigment seemed concentrated in the deeper layers, and only a few granules remained to show the position of the tapetum nigrum. Between these two layers lay the bony tissue already mentioned. It was about $1\frac{1}{2}$ *mm* thick in the middle, tapering off to a thin edge on all sides. It resembled closely the cancellous tissue of true bone, with concentric lamellæ and irregularly formed Haversian canals. There were numerous leucocytes about this tissue but no trace of the choroidal vessels except in the deeper parts where the pigment had accumulated most heavily. Diagnosis: "Phthisis bulbi with ossification of the choroid."

I hardly need add that the patient's unpleasant symptoms were speedily and completely relieved by the removal of the eye.

ON THE CIRCULATION AND DIMINUTION OF TENSION IN ATROPHIC EYES.

By Dr. G. ISCHREYT, Riga.

(*With three figures on Plate V., Vol. XXXVII., German Edition.*)

Slightly abridged translation by Dr. Ward A. Holden.

THERE is scarcely another section of ophthalmology that has excited the interest of the investigator in greater measure than the matter of the changes in intraocular tension. Besides clinical observation, experiments on animals and pathological examinations have been made in great number, and the literature of the subject is voluminous.

In general we may distinguish two main directions which research has taken: first, the study of the nerves supposed to govern secretion, chiefly by means of animal experiments; and, second, the pathological examination of human eyes which clinically had exhibited anomalies of tension. Both methods have given us a mass of important facts, but notwithstanding their importance they represent only the first beginnings of a knowledge of the processes concerned.

Among the manifold conditions arising from alterations of tension we may distinguish two groups: one to which belong all those affections described as vasomotor neuroses, and another which includes the cases of alteration in tension following specific diseases of those parts of the eye which influence the equal balance of the liquids; the idiopathic alterations in tension as distinguished from the symptomatic. Strictly speaking, the difference between these two groups is not so great as would appear at first glance;

there are transition states from one to the other, for the possibility of nervous influences in symptomatic alterations of tension cannot be denied, and it is equally certain that pathological changes underlie the idiopathic anomalies of tension. It is only the insufficiency of our methods of investigation that prevents us from recognizing the nervous influences and perceiving these alterations.

In taking up the results of pathological investigations it is noticeable that all the investigators have concerned themselves with increased tension only. After some of the conditions now known as secondary glaucoma came to be understood rightly, a series of investigations following those by Knies, Weber, and Birnbacher and Czermak brought us nearer to a complete understanding of primary glaucoma, and it may justly be said that this chapter at present has been more comprehensively treated than any other regarding anomalies of tension.

It is different with the pathological examination of conditions of hypotony, of which spontaneous detachment of the retina only has led to a considerable literature and to ingenious investigations for its explanation. Atrophy of the ball, which is of such clinical importance, has never been sufficiently studied in its relation to hypotony, although various other questions in regard to it have been discussed. When we glance through the literature we find only isolated remarks and occasional aphoristic experiments for the explanation of the causes producing this form of hypotony. Even such detailed papers as those by Wagenmann (29), Kostenitsch (9), and Schirmer (18) either give no statements in regard to the tension of their eyes or they treat of the vessels in so general a manner that conclusions cannot be drawn as to their relations to the intraocular tension.

Without attempting completeness, I shall cite the few papers which I found to contain any statements in regard to the probable causes of hypotony in atrophy of the ball.

Graefe (8) first separated idiopathic atrophy from symptomatic, and distinguished essential phthisis bulbi from atrophy following inflammation. In explanation of the for-

mer he alludes to a neuralgic process which "in a peculiar manner affects the nerves governing intraocular secretion"; but in explaining the latter it is noteworthy that he regards the cause to be not the inflammatory conditions *per se*, but the consecutive changes in the nerves of secretion.

Nagel (17), in opposition to this view, regards the cause to be a disorganization of the vessels and altered intraocular circulation.

De Wecker (30) attributes that decrease in tension which follows an initial stage of slight increase in sympathetic plastic iridocyclitis to "retraction of the new membranes formed by exudation."

In the paper by Birnbacher and Czermak (2) are the following passages: "If one supposed a capillary area to become suddenly impassable, the resulting stasis in the smallest afferent arteries would, just as if a stasis on the part of the veins was conducted here through the capillaries, be paralyzed by the tonus of the arteries, and neither in the afferent nor in the collateral arteries would the tension be increased. A portion of the transudating surface corresponding to the capillary area has been lost, however, and since the conditions for the exit of the transudation remain as before, the tension in the tissues must correspondingly decrease." "The acute inflammation must increase the intraocular tension through dilatation of the arteries and increased permeability of the capillary walls. According to Cohnheim, however, an increased resistance to the blood current appears at the same time, and this overcompensates for the increased tension caused by the dilatation of the vessels. When still other compensatory possibilities are added, such as an unhindered exit through the venous trunks, it is evident why in iritis, iridocyclitis, and acute non-suppurative choroiditis, a decreased resistance of the ball may ensue."

Wagenmann (29) calls attention to the great dependence of intraocular tension upon the involvement of the ciliary body in tuberculous processes of the anterior portion of the uveal tract, without going into the probable causes of this.

Michel (16) considers the cause of the diminution in tension in severe cases of choroidal disease to be due to a decrease in the amount of the ocular liquids.

Fuchs (5) believes the increased tension at the beginning of a cyclitis to be due to the increase of the contents of the ball through the deposited exudation, while he regards the decreased tension in the later stages of the disease as being due to a shrinking of the organized exudation.

The eyes which I have used all presented the clinical picture of iridocyclitis. In 1, 2, 3, 4, and 5 metallic foreign bodies perforating the eyeball were the cause of the uveitis; in 6 no traumatic cause could be discovered; in 7 there was an injury from a foreign body which caused a purulent infection. In 2, 3, 4, 5, and 6 the tension was diminished, in 1 normal, in 7 probably normal, although records are wanting. All the patients were young.

Case 1.—A. B., aged twenty. Five years before in an explosion a bit of a piston flew into the left eye, which lost its vision, but has not been painful until lately. The right eye is normal. The eye was enucleated and put into formal solution. It was somewhat shrunken. Above and below a portion was removed containing the upper and lower outer venæ vorticosæ. These portions were imbedded in paraffin and cut in serial sections. The ball itself was put into alcohol, imbedded in celloidin and cut in toto.

General Topography.—The metallic foreign body, 2 *mm* long and 0.75 *mm* wide, lay near the sclera, surrounded with a sheath of round cells. A short distance away were tracts of dense connective tissue, which in part formed a capsule that was continued to the sclera. Between the foreign body and the sclera the capsule was less marked, and remains of the degenerated retina were seen. The retina was entirely detached and adherent only at the optic disc and the ora serrata. The funnel-shaped retina was pervaded with tracts of connective tissue which had exerted considerable traction. Near the disc this had been so strong as to tear the choroid away from the sclera where choroid and retina were attached.

The choroid was greatly changed and the zone corresponding to the capillaris had been transformed into bone. The

pupillary margin of the iris was at points adherent to the lens capsule, and the pupil was blocked with new tissue.

Special Changes.—The conjunctiva and the portions of the sclera bordering the cornea were not particularly rich in vessels, and the episcleral venous network was not well filled. Only near the scleral scar were these vessels better filled—a purely local condition. The anterior ciliary arteries showed no thickening of the walls. The ciliary venous plexus was divided into many vessels, and its lumina were not well filled. The posterior pigment layer of the iris showed nodular proliferations. The parenchyma of the iris was of normal appearance and contained no accumulations of round cells. In the arteries one saw here and there thickenings of the intima and narrowing of the lumen. Such changes were not found in the veins, which were in many cases dilated. The ciliary process had undergone a connective-tissue degeneration. Here and there were dilated vessels and small arteries with thickened walls. In the ciliary muscle were thickened septa and isolated dilated veins. The choroid showed a fibrous degeneration at certain points, but in general was well preserved. The veins were not better filled than normal, and there was venous hyperæmia in the neighborhood of the foreign body only. There was stasis in many veins. The arteries showed all the transition stages between abnormal overfilling, and complete obliteration of the lumen through proliferation of the endothelium. The walls were thickened. The emissaries of the vortex veins were not abnormal in size or appearance. The lumina of the veins were moderately filled. The trunks of the posterior long and short ciliary arteries showed no signs of proliferation of the endothelium. The optic nerve and retina were degenerated. The vessels were mostly obliterated, and many of them were surrounded by thick sheaths of cells.

Case 2.—C. W., aged twenty. A bit of gun-cap flew into the right eye three years before. Eyeball small and soft. A scar in the cornea, to which the iris is adherent. Chronic iridocyclitis. Enucleation on account of sympathetic irritation.

The entire contents of the eye were greatly shrunken, the retina wholly detached.

Special Changes.—The posterior conjunctival veins and the episcleral venous network were overfilled. The arteries showed no proliferations of intima and were not overfilled. The scleral branches of the anterior ciliary veins were wide, the perforating

branches of the anterior ciliary arteries of normal appearance. The lumina of the ciliary venous plexus were cleft-shaped and partially collapsed. The root of the iris was adherent to the ligamentum pectinatum, so that the anterior chamber was partly obliterated. The tissue of the iris was atrophic and contained few vessels where it was bound down by new membranes. In other portions the vessels were more numerous, but many of them had constricted lumina. The walls of both arteries and veins were often thick and presented hyaline degeneration. The proliferation of the intima was more marked in the arteries than in the veins. The lumina of the latter were wide. The cyclitic membrane consisted of connective tissue and contains few cells. The major circle of the iris was cleft-shaped at the points of greatest traction from the new membranes, elsewhere it was round and well filled. The epithelium of the ciliary processes had been destroyed at many points and the neighboring vessels were obliterated. The veins were widely dilated and tortuous. The choroid was in places almost wholly obliterated and without vessels, but in the posterior segment there was venous and capillary hyperæmia. The arteries had thickened walls, and in some the lumen was small. The thickening was mostly confined to the adventitia. There was no cellular infiltration of the choroid. Near the posterior pole there were concentric laminæ of bone in the inner layers. The emissaries of the vortex veins were wide and the circumvascular spaces were broad. The short posterior ciliary arteries at certain places within the sclera exhibited an evident endarteritis. The optic nerve and retina were degenerated, and the vessels of the latter were thickened and often surrounded by pigment.

Case 3.—P. K., aged twenty-two. While hammering the day before a bit of steel penetrated the left eye passing through the cornea and entering the lens. Some hypopyon. Iridectomy, magnet extraction of foreign body, later extraction of lens. Subconjunctival injections of sublimate.

Nearly two months later the atrophic and sensitive eye was enucleated because of beginning failure of vision in the other.

The form of the ball was fairly well preserved. The cornea was kidney-shaped, after hardening greatly folded. The iris was retracted, the pupil closed, the retina detached, the ciliary processes covered with a new membrane, and the posterior portion of the ciliary body detached from the sclera and drawn inward.

Special Changes.—The bulbar conjunctiva was richly pervaded with round cells which for the most part lay about the vessels like sheaths. The lumina of the veins were abnormally large but rarely full and round. The arteries were narrow with thickened walls. The anterior ciliary arteries were narrow and the veins wide. The lumina of the ciliary venous plexus could no longer be discerned. The iris had but few vessels and contained many round cells, arranged diffusely and in nodules. Behind the iris was an exudation rich in cells. The bundles of the ciliary muscle posteriorly were separated by liquid, and there was a diffuse cellular exudation. The ciliary processes had undergone connective-tissue degeneration, and remains of many obliterated vessels were seen while others had thickened walls.

In the vessels of the major circle of the iris were seen thickenings of the walls and proliferations of the intima. The infiltration of the ciliary body was mostly diffuse. The veins leaving the ciliary body were relatively wide, with thin walls, and were well filled with blood. The choroid was chiefly affected anteriorly, where there were many nodular collections of round cells. The vortex emissaries were wide and the circumvascular spaces were clearly to be seen. The long and short posterior ciliary arteries were well filled behind the eyeball. The optic nerve and retina were degenerated.

Case 4.—C. B., aged twenty-two. The right eye was perforated five weeks before by a bit of gun-cap.

There was a scar at the upper-inner margin of the sclera. The iris was discolored. In the anterior chamber lay a yellowish-gray mass filling the pupil and extending beyond it. The ball was small and soft. The left eye showed signs of irritation and was sensitive to light.

The right eye was enucleated, hardened in Flemming's solution and alcohol, and imbedded in celloidin.

The foreign body was 6 *mm* in diameter. It had passed through the sclera and ciliary body and lay behind the lens and in the posterior chamber. The lens, luxated forward, forced the iris against the cornea. The ciliary body near the wound was entirely degenerated. The ciliary muscle was drawn inward from the sclera. The pupil was blocked, the retina degenerated.

Special Changes.—The conjunctiva was greatly loosened and chemotic. Its veins were markedly hyperæmic, while the arteries were less so. In some of the latter one saw thickenings of the

wall and proliferations of the intima. In the tissue were collections of round cells, frequently near the vessels. The episcleral veins were well filled, particularly near the scar. The arteries here had narrow lumina from thickening of their walls. The episcleral tissue was infiltrated with round cells and the infiltration followed the vessels into the sclera. The perforating branches of the anterior ciliary arteries showed different relations according to the thickness of their walls. In some vessels there was a thinning of the walls at the cost of the media and in them the lumen was wide. The scleral branches of the anterior ciliary veins were well filled. The lumina of the ciliary venous plexus were wide and round. The anterior surface of the iris was covered with a new membrane which continued over the pupil. The vessels for the most part were obliterated, but those remaining were dilated. The walls were thickened from hyaline degeneration. The major arterial circle of the iris could still be recognized, with cleft-shaped lumen and thickened walls. At other points the lumen was almost wholly closed. The fibres of the ciliary muscle were forced apart and distorted, particularly posteriorly. The processes were covered with a cellular exudation. The arteries of the ciliary body all had thickened walls, and in some there was a proliferation of the intima, but in others the lumen was wide. The veins were dilated. On the posterior surface of the iris and the inner surface of the ciliary body there was a cellular exudation. About the foreign body the exudation formed a thick sheath. An eyelash lay in the exudation. The choroid and retina were infiltrated everywhere. The veins of the choroid were greatly dilated, the arteries were narrow and had thickened walls. The vortex veins were large and had a round lumen. There was no evidence of narrowing or flattening, although there were collections of round cells and pigment cells in the vessel walls and in the circumvascular spaces. The trunks of the short posterior ciliary arteries had greatly contracted walls.

Case 5.—N. N., aged twenty-two. The patient had injured his right eye six months before.

Right eye, atrophy of the ball. Enucleation for sympathetic irritation. The ball was placed in formol and alcohol, and imbedded in celloidin. The posterior portion of the ball was greatly flattened, the anterior of fairly normal curvatures.

Horizontal external diameter 19 *mm*, transverse 22, vertical 21.

An iron foreign body 3 *mm* in diameter lay behind the middle

and lower portions of the ciliary body. The lens retained its normal position, but was surrounded with a fibrous membrane which anteriorly blocked the pupil. In this membrane on the posterior surface of the iris and the ciliary body were large concentrically curved plates of bone. The ciliary body was greatly altered, and the processes were drawn forward and united to the folds of the detached retina.

Special Changes. — The conjunctiva was moderately swollen. The posterior conjunctival veins were not particularly well filled, but the vessels of the circumcorneal region were well filled. The episcleral and scleral branches of the anterior ciliary veins were in a high degree hyperæmic. The perforating branches of the anterior ciliary arteries were of normal calibre and had normal walls. The iris was greatly infiltrated with round cells which were found chiefly in its deeper layers. The vessels had largely been destroyed in consequence of marked proliferations of the intima, and the walls had undergone hyaline degeneration.

There was an exudation on the posterior surface of the iris binding it down to the lens. It contained connective-tissue tracts and plaques of bone. The lumina of the ciliary venous plexus were very irregular and poorly filled with blood. The neighboring veins were wide. The ciliary body was poor in vessels, particularly those of middle and small calibre. In the inner layers and the adjacent parts there was a diffuse cellular infiltration. The processes were filled with round cells and no vessels could be recognized. The meridional fibres of the ciliary muscle were stretched and forced apart. Many of the arteries were narrowed while others were dilated. Branches of the long posterior ciliary arteries in the outer portion of the ciliary body showed no endarteritic changes. The major arterial circle of the iris could not be made out with certainty. The choroid had taken part in the choroiditis in high degree and it was greatly infiltrated with round cells which here and there were clustered together to form nodules. The degeneration of the choroid was most pronounced in the equatorial zone and here there were fewest vessels present. In the posterior third there was capillary and venous hyperæmia. The arteries were somewhat flattened and were of normal or reduced calibre. The wall was thick in comparison with the lumen, which was mostly due to a contraction of the media. The branches of the posterior short ciliary arteries perforating the sclera showed constrictions and reductions of

calibre. The extrabulbar trunks showed a greatly contracted media and a relatively narrow lumen. Proliferations of the intima could not be found. In the anterior segment of the choroid some of the veins had large lumina. The trunks of the long posterior ciliary arteries had the same appearance in their extrabulbar course as the short. The venæ vorticosæ had wide lumina. The circumvascular lymph space about the two upper veins was quite wide, that about the lower contained groups of cells. The retina was completely degenerated.

Case 6.—Mrs. E. K. aged twenty-seven. The right eye suddenly became diseased five years ago. Within two days vision fell to the ability to count fingers near by. Now V = No p. l.

The right eye showed circumcorneal injection. The anterior chamber was shallow, the iris atrophic, posterior synechiæ. Yellow cataract with some pigment precipitates on the anterior surface. V = 0. T − 2.

Diagnosis: iridochoroiditis chronica, cataracta consecutiva. The eye was enucleated and hardened in formol and alcohol.

Its antero-posterior diameter was 21 *mm*, its horizontal 20, and its vertical 19. The anterior chamber was shallow, the iris was forced forward and at its periphery rested upon the cornea. The lens occupied its normal position. Its posterior surface was covered with a plastic exudation in which were included the ciliary processes and folds of the totally detached retina.

Special Changes.— The conjunctiva was fairly normal. The episcleral venous network as well as the perforating branches were much wider than normal.

In some sections one saw an overfilled anterior ciliary artery without any proliferation of the intima. In the smaller arteries one found nodular excrescences from the intima.

The ciliary venous plexus could not be found with certainty on account of the dense cellular infiltration. The iris was pervaded with round cells, partially scattered diffusely, partially collected in groups. The vessels of the iris had mostly been destroyed. The major arterial circle was wide, round, tensely distended with blood, the walls thin, without endarteritis. The ciliary processes were irregular and partially degenerated. The veins were in part greatly dilated. Many arteries were small and showed hyaline degeneration. In some there were signs of stasis. The bundles of the ciliary muscle were forced apart posteriorly and near the iris and the ciliary processes there was a round-celled infiltration.

The small vessels showed hyaline degeneration. In the orbiculus normal vessels were seen. The choroid contained but few nodules of round cells and had taken little part in the uveitis. In its posterior portion there was marked capillary and venous hyperæmia, and the veins were at many places very greatly dilated. Some of the arteries had a narrow lumen. The posterior ciliary arteries behind the ball showed distended walls without changes in the intima. The vortex veins were wide and tensely filled with blood. At various points about them was a round-celled infiltration. The retina was highly degenerated, and only the nuclear layers could be recognized. The vessels were in part obliterated and surrounded by hyaline areas. The optic nerve exhibited tracts of round cells among its fibres.

For obvious reasons little attempt was made to measure individual vessels for purposes of comparison.

THE GENERAL CHARACTER OF THE UVEITIS.

O. Schirmer (18) made a very thorough examination of the chronic traumatic iridocyclitis causing sympathetic ophthalmia, and defined its characteristic symptoms. My cases, in which also there was trauma followed by sympathetic irritation of the other eye, confirm his results absolutely.

The essence of this chronic uveitis consists in a diffuse or nodular round-celled infiltration and in an exudation of a cellular, fibrous nature from the ciliary body and iris, which has a tendency to be transformed into a fibrous tissue poor in cells. This plastic exudation, as Brailey called it, may vary greatly in different cases. The extension of the process stands in no relation to the distribution of the vessels.

In the iris there was a diffuse infiltration with round cells as well as disseminate nodules composed of these cells. The pigment layer was more or less disturbed as regards continuity, and was irregularly increased. The ciliary body was less infiltrated than the iris. The ciliary processes were in some cases completely taken up with the infiltration. In Case 1, in which the foreign body was in the equatorial portion of the ball, the anterior portion of the uvea was but slightly affected. The choroid was but slightly involved in all of the cases and

the infiltration was mostly limited to isolated nodules of leucocytes. The most marked changes in the choroid were near the ciliary body and in the equatorial region. The plastic exudation was always near the foreign body, sometimes enveloping the ciliary processes, filling the posterior chamber, surrounding the lens (5), blocking the pupil in Cases 2, 3, 4, and 5, and in one case lying on the anterior surface of the iris (4). The nature of the exudation varied greatly; in some cases it was almost exclusively cellular, in others there was a marked development of connective tissue.

In Case 1 a round-celled infiltration was present only in the immediate neighborhood of the foreign body, while in Case 2 the exudation had everywhere been transformed into connective tissue. These were old cases. In three cases bone was found, either in or on the choroid and once in the membrane about the lens. When Schirmer states that, contrary to Deutschmann, he did not find that the exudation was of a purulent character, I can agree with him. In Cases 1–4 the cells of the exudation were almost exclusively uninuclear leucocytes, while in Case 7, which clinically presented the picture of purulent iridocyclitis, only multinuclear leucocytes were found.

THE HYPERÆMIA OF THE ANTERIOR CILIARY VEINS.

It has long been known that in inflammatory affections of the uvea the anterior ciliary veins present a marked fulness. Arlt considered this an important symptom and called attention to the fact that the process of exudation in the first stage of the disease causes a dilatation of the arteries, replaced later by an overfilling of the veins. Leber also directed his attention to this point when he was studying the vascular supply of the eye, and mentioned the hyperæmia of the episcleral venous network in acute iritis and cyclitis, he finding the deeper vessels more congested in cyclitis. Van Woerden also found the injection more pronounced and lying farther from the corneal margin in cases of cyclitis.

This symptom is, as is well known, also found in glaucoma.

If we look over the ideas as to the explanation of this

venous hyperæmia, we find that some believe that the hyperæmia is due to an increase in tension and others believe that it is due to a diminution. Since MacKenzie and Graefe, it has been generally held that the ciliary hyperæmia in glaucoma represents a stasis in consequence of increased tension which blocks the channels of exit, but lately v. Krüdener (10) has shown an apparent dependence of the hyperæmia upon a diminution of tension. In two eyes with choroidal sarcoma he found abnormally dilated anterior ciliary veins associated with hypotony. My experience confirms these observations fully. In all the eyes with diminished tension that I examined there was a very marked dilatation of the veins of this system. It will be shown below, however, that the hypotony is not the cause of the latter, but rather that both symptoms result from a common cause.

Arlt (1) was of the opinion that the marked development of the veins in all cases of "choroiditis" (among which he included glaucoma) was due to a hindrance in the backward flow of the venous blood. This is caused by the pressure which the choroidal exudation exerts, or because of adhesion between choroid and sclera.

Leber (11), in his treatise written in 1865, leaves the question unanswered whether the dilatation occurs in consequence of the excessive outflow or whether it is due to inflammatory excitation. For glaucoma he accepts the former explanation of the widening of the veins, since he believes that the interference with the venæ vorticosæ may be a cause of the increased tension.

v. Krüdener (10) offers the explanation that the veins, compensatorily enlarged, furnish a constant channel of exit less influenced by physiological variations of accommodation, movement of iris, pulsatory and nervous influences, than the veins formerly smaller.

While the explanation of the hyperæmia of the anterior ciliary veins as a hyperæmia from stasis is sufficient for all processes with increased tension, it fails when we consider those with hypotony. Equally impossible is it to conceive this excessive filling of the veins to be due to a removal of the external vascular pressure in consequence of the

hypotony. We must therefore seek the causes in the vessels themselves.

According to Leber's schema, the anterior portion of the uvea receives its blood both from the anterior ciliary arteries whose perforating branches pass through the sclera and enter the ciliary muscle, and also from the long posterior ciliary arteries.

These two systems connect in the major arterial circle of the iris and also anastomose in the ciliary muscle, and from the connections the entire anterior portion of the uvea is supplied.

The venous blood is almost wholly carried backward into the vortex system, though a small amount is carried off through the anterior ciliary veins.

If, now, we suppose a plastic iridocyclitis to exist, first the vascular areas of the iris and ciliary processes must be choked by the round-celled infiltration and by the new-formed connective tissue. A similar process takes place in the ciliary muscle, but not everywhere in equal degree, the changes being more marked in its posterior segment. Provided now that the amount of blood carried to this region by the anterior and long posterior ciliary arteries remains the same, that portion of the latter which previously supplied the obliterated vessels must now find new channels of outlet. Such preformed passages are found in the arterial branches of the anterior segment of the ciliary body. From here the blood passes through the corresponding capillaries into the venous vessels which are in communication with the ciliary venous network and empty their blood through the perforating branches into the anterior ciliary veins. Besides this passage there are to be considered the recurrent branches from the major arterial circle and the anastomoses in the muscle of the anterior and posterior ciliary arteries.

The obliteration of a portion of the arterial twigs is followed by an acceleration of the current in the others; the latter become dilated from the increased pressure.

Therefore, while the hyperæmia of the anterior ciliary veins occurring with increased tension is due to a carrying off of the venous blood through widened venous anastomoses,

the hyperæmia occurring with diminished tension is due to a displacement of the arterial current to an area which under normal conditions plays only a minor rôle.

In my cases 2, 3, 4, 5, and 6, the anterior ciliary veins, the episcleral network, and the perforating branches were overfilled, while they were not filled in Case 1. The fact that the shrinking process in the ciliary processes and iris was here less marked than in the other cases indicates clearly the dependence of the venous ciliary hyperæmia upon these processes.

Leber supposed that the dilatation of the anterior venous channels might be due to an inflammation. In all my preparations it was found that the chief inflammation was in the iris, ciliary processes, and choroid, while the anterior portion of the muscle, the sclera, and the conjunctiva were only slightly involved.

The fact that hyperæmia of the ciliary veins is seen so frequently and in such different conditions suggests that we have to do with a compensatory arrangement which relieves the anterior portion of the uvea in slight disturbances of circulation.

THE CHOROIDAL VESSELS.

Since the choroid in general is less disturbed than the anterior portion of the uvea, we find its vascular system fairly well preserved; the anterior and equatorial portions have suffered more, the posterior less.

The veins and capillaries exhibit a hyperæmia localized in this posterior third, which appears to be proportional to the diminution in tension. In Case 4, the disturbance in the choroid was of so high degree that a fair judgment could not be obtained. The walls of the veins were not markedly altered. Here and there venous stasis was observed which was readily explained by the character of the inflammation. The lumina of the venæ vorticasæ were large and round or oval, distended with blood; nowhere were there constrictions of the scleral canals. The circumvascular spaces were clearly defined; in Cases 2 and 5 they were of considerable width.

The arteries were normal or of diminished calibre.

The venous hyperæmia of the choroid cannot be considered a hyperæmia from stasis, since the outflow through the vortex veins is in no way interfered with. One must suppose rather that the diminution in tension brings it about. For since the fulness of a vascular region depends upon the relation between blood tension and tissue pressure, the intraocular tension corresponding to the latter, a diminution of this must lead to an increased filling of the vessels. The veins and capillaries are particularly concerned here on account of the thinness of their walls. Besides these general considerations there is another point which should be specially noticed.

According to Straub (20) the intraocular tension depends under normal conditions, as is well known, upon the choroid, whose muscular elements have adapted themselves to this purpose in such a way that vessels are less exposed to the influence of the intraocular pressure. If from any cause the choroid loses its elasticity, its vessels lose their natural protection, and there may readily occur compression of the veins by the choroid being forced against the sclera by the intraocular pressure. v. Krüdener (10) has shown in cases of sarcoma in what manner this decrease in elasticity may occur. It may also be presumed that a uveitis of long duration may act in the same injurious manner. The decrease in the elasticity of the choroid is, however, in conditions of hypotony, capable of increasing the venous hyperæmia already existing.

The flat form of the arteries may be explained as a direct result of this latter. Leber (11) calls attention to the relations of the choroidal vessels as follows: "The arteries and veins in the posterior segment of the choroid lie close together and interlace so that it is hardly otherwise than certain that they mutually exercise upon one another a varying pressure according to the degree of their fulness."

Let us now consider the results of the general dilatation of the venous system. The releasing of the walls of the veins from the external pressure, and the width of the vortex veins increase the difference in pressure between the beginning and the end of the current. The dilatation of the capil-

laries increases the current in the arteries, the dilatation of the veins that in the capillaries. The sinking of the resistance in the vortex veins creates a force which in a measure sucks out the blood from the entire area. This may be the reason why there is no slowing of the current in the arteries.

COMPENSATORY ENDARTERITIS.

The doctrine of compensatory endarteritis and endophlebitis promulgated by Thoma (21–25), and supported by many experiments performed by Thoma and his pupils, is, in short, as follows: Every artery is adapted to a particular physiological rapidity of current. Changes in the latter are felt by an individual nervous apparatus in the vessel wall, and thus is brought about a regulation of the width of the lumen so that the blood current is restored to its former rapidity. Under normal conditions this is accomplished by the vessel tonus. Decreased rapidity of current thus causes contraction of the vessel, increased rapidity a dilatation of the lumen, until the original rapidity of the current is restored.

It may happen, under pathological conditions, that the physiological tone of the vessel wall is no longer sufficient for this regulation. This is the case, for example, when with the cutting out of a portion of the peripheric blood-conducting apparatus the resistance is increased, and thus the blood current in the afferent artery slowed down. Then follows a narrowing of the lumen, either through a concentric atrophy of the media or through the formation of new tissue in the media, or through both. In the stump after amputation, Thoma's (25) classic example, "the disturbance of circulation leads to a narrowing of the lumen of the main artery through tonic contraction of the musculature of the vessel."

These processes take place also when primary affections of the vessel wall have diminished the tone, so that it does not suffice for the demands made upon it.

R. von Garnier (6 and 7) was the first to apply the doctrine of secondary compensatory endarteritis to processes in the eye, although others before him described vascular changes

which are applicable here. Thus Ulrich (26 and 27) observed in various conditions changes in the vessels of the iris, which he called sclerosis of the adventitia, hyaline degeneration of the vessel, and vitreous swelling and endarteritis, considering them dependent upon a primary sclerosis of the iris. v. Garnier (7) found diffuse secondary arteritis in various diseases of the eye. He says: "Secondary diffuse endarteritis is observed in the eye when there are changes in the capillary circulation; in the central artery when there are changes in the retinal circulation, in the posterior short ciliary arteries with changes in the choroid capillaries, and in the long and anterior ciliary arteries with changes in the ciliary body and iris." It is frequently found that in continued increase of intraocular tension and in glaucoma, a primary endarteritis is added to the secondary. Synechiæ of the iris and cicatricial states and atrophy of the ciliary body and choroid produce an endarteritis of the ciliary arteries, which is to be attributed to an increased permeability of the capillaries and shrinking of the tissues. "A good example of a secondary diffuse endarteritis is presented by the ciliary vessels after iridectomy."

von Krüdener (10) found in three cases of choroidal sarcoma accompanied with increased tension a concentric contraction of the lumen of the major arterial circle of the iris, which he attributed to a slowing of the blood current; endarteritic changes could not be found.

Although the study of endarteritic compensation is, in itself, highly interesting, yet it deserves consideration from another view-point. For since the extension of the compensatory endovasculitic processes depends upon a decrease in the rapidity of the current, its absence would imply a normal condition of the latter. Under certain circumstances we would recognize, through the intact condition of individual vessels, the new pathways which the blood has formed in consequence of pathological changes.

I come now to speak of my preparations and the relations of particular vascular areas. The anterior ciliary arteries and their perforating branches have a fairly normal lumen or they are slightly contracted. The vessel wall, except in Case 4,

exhibits no thickening, and proliferations of the intima are not to be found. The extrabulbar trunks of the long posterior ciliary arteries do not show signs of proliferation of the intima. In one case (6) there was proliferation of the intima in the portion of the vessel within the sclera. The major arterial circle of the iris differed greatly. In Case 5 it was wholly obliterated and unrecognizable, in 4 it was cleft-shaped, and in 2 and 6 it was large, round, and distended with blood. This great variability was observed also in different preparations from the same eye. The thickness of the wall varied in the same manner as the width of the lumen. The iris and ciliary processes were the portions most affected. The vascular system of the iris often exhibited such a degree of obliteration that arteries could no longer be distinguished from veins. In Case 1, in which the uveitis was mild, the intima of the arteries was thickened and the lumen of the veins enlarged. In Cases 2, 3, 4, and 5 there was an advanced hyaline degeneration of the vessel walls.

The vessels of the ciliary processes in Cases 4 and 5 have been destroyed by cellular infiltration, in Cases 1 and 2 by new-formed connective tissue, and in Cases 3 and 6 they are partly obliterated and have undergone hyaline degeneration. In Cases 1, 3, and 6 the veins are dilated and the arteries are narrowed and have hyaline sheaths about them. The vascular region of the ciliary muscle is less affected than that of the processes, but here also one finds, besides dilated veins, narrow arteries with thick hyaline walls and wider arteries with walls relatively thin (2 and 4). The short posterior ciliary arteries in their extrabulbar course mostly have a narrow lumen and contracted walls (particularly 3, 4, and 5).

In Case 3 the nuclei of the endothelium were increased. Thickening of the intima was found only in Case 6 and here only in a single artery. In all the others the elastica lay immediately upon the endothelium.

In the scleral branches of Cases 2 and 5 endarteritic narrowing of the lumen was observed. The arteries of the choroid showed all transition states between normal fulness and complete obliteration from proliferation of the intima. In general they are pressed flat and have thick, contracted

walls. Endophlebitic proliferations were nowhere present except in the veins of the iris and ciliary processes, and, in smaller measure, of the ciliary muscle.

Briefly expressed, the conditions were a limiting of the endarteritis to some fairly sharply localized regions and a lack of it in most of the main trunks.

Since this finding is rather remarkable its correctness must be established before an attempt is made to explain it.

The fact that I had no complete series of sections permits the objection that endarteritic processes may have existed over a much greater area than was apparent and that the chief afferent trunks may have been much affected. I was skeptical myself until I was convinced by examining specimens of a choroidal sarcoma that the compensatory endarteritis of the posterior ciliary arteries, even when the sarcomatous degeneration of the capillaries was extensive, was not so marked as one would have expected. Besides some greatly narrowed arteries there were also some with slight proliferation or wholly without proliferation, so that one must conclude that at certain points collateral exits form which prevent a permanent slowing of the current, for only in this manner can the lack of a compensatory endarteritis be explained.

The causes of the slight extent of the endarteritis in the trunks of the ciliary arteries must be sought in a facilitated carrying off of the blood so that the effect of the blocking of single twigs does not affect the circulation. Let us suppose an artery dividing into two branches, with an interference with circulation in one of the branches (a). The result will be that the current will become lessened in this branch and the walls will react by a contraction or by endarteritis. This will be continued into the main trunk, provided that the second branch (b) is not able with the original rapidity to carry off the excess of blood thrown into it by the narrowing of the branch (a). As soon as this is brought about, however, the current in the main trunk will not be slowed and thus there would be no cause for a compensatory endarteritis. In our case, however, as we have seen, the following takes place:

1. In the system of the long posterior ciliary arteries the

excess of blood caused by the destruction of the iris and ciliary processes is equalized by means of an increased exit through the anterior ciliary veins.

2. In the system of the short posterior ciliary arteries the same condition is relieved by an increased exit through the vortex veins.

We may, therefore, in cases of less advanced destruction, expect a compensatory endarteritis only in such branches of the system as are, like the branch (a) in the example, cut off from the general circulation. Such excluded areas are the iris, ciliary processes, and portions of the choroid and ciliary muscle, corresponding to those vascular areas in which in our preparations we found a compensatory endovasculitis.

The rapidity with which a compensatory endarteritis may develop is shown by an observation of v. Garnier's, who found changes of this sort in an eye with traumatic cataract and increased tension, six weeks after the injury. To this case I may add another in which the interval was but two weeks and a half.

Case 7.—W. S., aged twenty-six, presented himself March 31, 1896, with a fresh injury of the left eye caused by the entrance of a splinter of iron. To the inner side was a small wound in the sclera and hypopyon.

Subconjunctival injections of bichloride were made, but as the right eye became irritable the left was enucleated, hardened in formol and alcohol, and cut in celloidin.

The conjunctiva, ciliary body, and iris were infiltrated with round cells. The ciliary muscle was fairly well preserved. The entire vitreous was pervaded with round cells. The choroid was less affected than the remainder of the uvea, but the retina was affected in high degree.

The episcleral vessels were overfilled, the veins more than the arteries. The media of the former was compressed and thin in comparison with the adventitia. The perforating veins of the sclera and the ciliary venous plexus were dilated. The iris vessels showed a marked hyaline degeneration of their walls and obliteration of their lumen, with dilatation here and there. The major arterial circle of the iris was dilated and its media distended. The ciliary muscle contained narrowed arteries with

hyaline walls and dilated veins. The arteries entering the ciliary processes were narrow and had hyaline sheaths, and the endothelium had proliferated. In the processes they were at places entirely obliterated. The veins here were dilated. The veins and capillaries of the choroid were wider than normal, the arteries narrow. At various points there was venous stasis. In sections through the short ciliary arteries no proliferation of intima was found.

In this case we had to do with a pronounced compensatory endarteritis in the ciliary muscle and processes which had developed within two weeks and a half, and in the iris had led to a complete destruction of the vessels. The rapidity of the process in this case was doubtless due to the excessive nutritive disturbances in the vessel walls in consequence of the purulent character of the uveitis. It is interesting to note the sharp localization of the endarteritis and the non-participation of the ciliary arteries. The latter fact is not surprising since in the smallest branches the vascular tone seems to have been sufficient to equalize the rapidity of the current.

SECRETION AND OUTFLOW.

It is to-day generally conceded that the aqueous humor is secreted by the ciliary processes almost exclusively. It has already been mentioned that clinical observation has connected variations in tension with pathological changes in the ciliary body. Previously only suppositions as to the nature of these processes have been put forward, the ciliary body being concealed from direct observation in life, and the examinations of enucleated eyes with cyclitis not having taken this matter into consideration.

Of the different forms of cyclitis, the more localized ones would form proper objects of such investigation. Tuberculosis of the anterior portion of the uvea is known to have no tendency to extend backward, and in such cases we may expect to find simple conditions, while in cases of traumatic iridocyclitis there are always complications, such as extensive shrinking of the vitreous, detachment of the retina, and

excessive plastic exudations. Cases of sarcoma or gumma of the ciliary body likewise furnish good material for such observations.

My experiments show that the ciliary processes form the most susceptible portion of the uveal tract, their exposed position and delicate anatomical structure predisposing them to bacterial and chemotactic influences. In Cases 3, 4, and 5 a marked degeneration of the processes was found in the short spaces of 11½, 5, and 2½ weeks respectively.

As Leber (12) has shown experimentally, the degree of inflammation depends upon the chemical composition and the location of the foreign body. Kostenitsch (9) verified the latter in human eyes containing a foreign body of copper. Thus there may be great variety in the degree and extent of the uveitis, which may be increased further by infection. The fact that in Case 1 only slight changes occurred in the ciliary body in the course of five years is due chiefly to the fact that the perforating foreign body lay fairly deep in the ball.

The diminution of the normal secretion is doubtless the first condition leading to hypotony, yet this is not sufficient to account for the latter entirely. The condition of the natural channel of outlet of the aqueous—the plexus venosus ciliaris—is of importance. In all my cases except one, the lumina of this plexus were narrow and irregular, yet this underfilling was not due, as in glaucoma, to a shutting off of the chamber angle or any other factor hindering the outflow, but rather to a decreased filtration on account of the hypotony.

From the works of Leber, Birnbacher and Czermak, v. Schultén, and Straub, we know that the eye possesses excellent arrangements for compensation, which equalize accidental variations of pressure. v. Schultén wrote of the relations between blood pressure and ocular tension as follows: "*A priori* one may assume that the greater the difference between the blood pressure in the vessels of the eye and the intraocular tension, the more liquid will be excreted until the normal balance is restored." In order that hypotony may exist, the arrangement for compensation must be disturbed.

Case 1 shows that the intraocular changes may be considerable without hypotony being clinically demonstrable because of the compensation. It was noticeable that there was lacking in this case the peculiar fulness of the anterior ciliary venous system with its perforating branches which was found in all the other cases. This is readily comprehensible, however, when we remember that the iris and ciliary muscle were well preserved and the ciliary processes had undergone a connective-tissue degeneration only in parts; for, according to the assumption, the venous hyperæmia of the anterior ciliary veins is a result of the destruction of this arterial area. The choroid in the neighborhood of the foreign body shows a marked venous hyperæmia, but is otherwise normal. The vortex veins are of normal width.

We have thus an eyeball in which all the conditions of hypotony exist, but at the same time a disturbance of the balance is prevented by an extensive contraction of the ocular capsule and other circumstances. If we conceive a further extension of the shrinking process in the anterior segment of the uvea, the next result would be a further contraction and partial obliteration of the corresponding arterial trunks and at the same time an increase in the anterior venous channels of exit. The more readily the venous blood may flow off on all sides the more rarely will there be stasis, and thus will disappear a final compensatory possibility, viz., a more excessive secretion from the vascular loops that are still preserved. A time then comes when the secretion is no longer sufficient to fill the ball.

Case 1, in which the axes of the eye were markedly diminished without hypotony or alteration in the shape of the ball, proves that the sclera can adapt itself to a considerable reduction in the contents of the eye, as was stated above. In this case the contents were diminished about $\frac{1}{10}$, as may be shown by calculation.

ON CONTRACTION OF THE SCLERA.

The width of the vortex emissary veins, as seen in almost all of the preparations, is remarkable. If the scleral capsule

contracted concentrically, as is usually supposed, the diameter of the vortex veins must become less. We are therefore justified in concluding that the shrinking of the sclera is unequal in different parts. The elastic nature of the sclera is now sufficiently proved.

Many observations have made it appear probable that it is chiefly the posterior half of the scleral capsule which adapts the capsule to changes of volume in the contents of the eye. If the anterior segment were movable it would not properly serve as a support for the optical and secretory apparatus.

RECAPITULATION.

Since the intraocular tension depends upon the relation between influx and outflow of liquids, a disturbance in its normal condition can arise only through a disturbance of this relation.

It has been shown that the condition of increased tension may be brought about by interfering with the outflow when this interference is so great that it is not compensated for by the diminished influx. If the disturbance has once taken place, there is added an increased secretion brought about by this cause. Both of these factors unite in bringing about the condition known as absolute glaucoma.

While in many conditions of hypertony the disturbed relation between influx and outflow depends primarily upon an interruption of the outflow and rarely upon a primary hypersecretion, it is natural to assume that hypotony is primarily brought about by a diminished influx, and investigations on atrophying eyes reveal indeed marked injury of the secreting portion of the eye — the ciliary processes.

As long as the diminution in secretion is slight, there may be compensation through other portions of the secreting area increasing their activity; furthermore, the lack of aqueous humor may be compensated for by a contraction of the elastic capsule of the eye. But if the diminution of secretion is considerable, hypotony becomes manifest. Slight causes may be sufficient to destroy the balance. While the normal channel of exit—the plexus venosus ciliaris—is free,

and the hypotony at the most has caused only a slowing of filtration, the destruction of the ciliary processes and the iris forces the blood of the anterior and long posterior ciliary arteries into new channels and thus gives rise to an increased anterior venous outflow; the diminution in tension and the increasing collapse of the ocular capsule remove the pressure from the vessels entering the venæ vorticosæ and allow them to dilate; the more the pressure sinks, the easier is the venous outflow. Here also a vicious circle develops; it results in the condition known as atrophy of the ball.

The rapid and unchecked outflow of the venous blood prevents any general diminution in the arterial current, and thus no secondary, compensatory endarteritis develops.

As regards the question of the compensatory arrangements in the eye, it seems probable that the anterior venous channel of outlet acts as a regulator of the circulation in the anterior segment of the ball; in case of interference either in the venous or the arterial area the excess blood is easily carried by through these channels.

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Explanation of the Diagrams Representing the Circulation on Plate V.

Of the three diagrams, No. 1 represents the anterior segment of a normal eye, No. 2 shows the circulatory disturbances in a glaucomatous eye, and No. 3 that of an eye atrophying from cyclitis.

A. et V. conj. — the posterior conjunctival vessels; A. c. a. — anterior ciliary artery; R. p.—perforating branch; C.—major arterial circle of the iris; A. c. p. l.—long posterior ciliary artery; R. r.—recurrent branch to the choroid; V. ad Ch. — vein to the

choroid ; P. v. c.—plexus venosus ciliaris, or canal of Schlemm ; P. s.—scleral and episcleral venous plexus of the anterior ciliary veins (V. c. a.).

In No. 2, there is a general venous hyperæmia ; the anastomoses between the veins of the ciliary muscle and the scleral branches of the anterior ciliary veins are widely dilated. The arteries are, in general, contracted ; the plexus venosus ciliaris is compressed.

In No. 3, the vascular areas of the iris and the ciliary muscle are obliterated ; the anastomoses between the anterior and the long posterior ciliary arteries, and also the arterial branches supplying the unaffected remainder of the ciliary body, are dilated. The entire region of the anterior ciliary veins is hyperæmic. The plexus venosus ciliaris is narrower than in 1, but wider than in 2.

ABSTRACTS OF ARTICLES IN VOL. XXXV. OF THE GERMAN EDITION OF THESE ARCHIVES NOT PREVIOUSLY TRANSLATED.

By Dr. C. W. CUTLER, New York.

I.—The Idea and Measurement of Central Vision from a Physiological Standpoint.

By Dr. **GUILLERY**, Cologne.

THE difference between central and peripheral vision is so marked that it is not enough to call it quantitative and to say that there is a gradual transition and that it is profitless therefore to seek a sharp distinction between them. A sharp distinction can hardly be made, but since certain writers speak of the region "quite near the pole of the retina" (A. Fick), others of the fovea, and still others of the entire macula as the centre of the retina, it must be confessed that the effort towards a more exact definition is not unreasonable. The author alludes to the different descriptions of this region by Kuhnt, Kölliker, Dimmer, Cajal, and Dogiel, which differ to such a degree that a solution of the question from an anatomical standpoint seems, as yet, impossible.

Physiological methods of examination, such as the perimeter with various objects, or the attempt of Cl. Dubois-Reymond,[1] which was repeated by Wertheim,[2] have not been more productive of definite results. As the author says: "What object could be small enough to determine differences of sensation in a region smaller than the

[1] *Arch. f. Ophthal.*, xxxii., 3. [2] *Arch. f. Ophthal.*, xxxiii., 2.

fovea, especially with the difficulty of fixation when the object is so near the fixation point?" It would seem, however, that the place of clearest vision would not be, at first glance, so hard to find if the method of examination could be based on the especial sensitiveness of this point.

By means of a procedure, the details of which are given partly in the article under consideration and partly in previous papers by the author, to which the reader is referred, the conclusion is reached that in an area whose diameter does not exceed 0.05 *mm*, the retinal elements may be considered equal in sensitiveness. Beyond this the functional activity diminishes perceptibly. This region of clearest vision is thus distinguished from the periphery.

There follows a theoretical discussion of statements of A. E. Fick and of Charpentier, regarding the mutual reinforcement of neighboring retinal areas, to which the author adds nothing new.

If the idea of a central area of clearest vision is accepted, the tests of vision must be applied to that area where the retinal elements are assumed to be equal. An actual measurement of the acuity of vision is not possible if the objects used have retinal images at one time confined to this central area and at another time extending to parts where the sensitiveness is notably less.

This theoretical consideration is, in the opinion of the author, a sufficient argument against the use of Snellen's types and especially against the usual method of registering the acuity of vision by a mathematical formula which pretends to an exactness to which it can lay no claim

For this and other reasons the author, in 1891, advocated the use of a system of separate points which should have diameters of sizes to produce retinal images from 0.0036 *mm* to 0.051 *mm*, small enough to fall within the above mentioned physiological centre. To Snellen's objection to such a method, namely, that the visibility of a single point is entirely dependent on its brightness, the results of Aubert's experiments are opposed, in which it was shown that the contrast between a black point and its white background may vary considerably without affecting its visibility; in diminishing

the contrast thirteen times it was necessary to increase the visual angle only from 35″ to 39″ that the point should remain visible. Groenouw[1] has more recently repeated these experiments and verified the results.

V.—A Physical Study of Ocular Pressure and Tension.

By Dr. **RUDOLF GRUBER**, Vienna.

The object of this paper is to discuss the relations between the intraocular pressure, which may be called hydrostatic, and the resulting resistance of the coats of the eye which we call tension. The author has no doubts as to the elasticity of the sclera; he shows the existence of this property and its relation to other forces, its relative importance and pathological bearings. Before we approach the complicated relations between intraocular pressure and tension we must understand that ocular tension (Augenspannung) is a function of intraocular pressure (Druck), though not alone of this, and we must guard against considering the pressure a function of the tension. In other words, all glaucoma theories by which the increase of intraocular pressure depends on alterations in the elasticity of the sclera must be discarded on physical grounds. The elasticity of the capsule of the eye serves only to compensate for small variations in intraocular pressure.

Every elastic, hollow body is in a state of equilibrium when it is so exactly filled that the elastic pressure of the content is balanced by the resistance of the walls, and in the eye this equilibrium is maintained without the development of elastic energy, or, to put it more simply, without stretching of the walls. Up to a certain point any increase of internal pressure will be balanced by the elasticity of the walls, but the effect of the pressure is felt on the inner layers of the walls sooner than on the external layers. This difference is shown by equations and a table, for the understanding of which reference must be made to a previous

[1] These Archives, xxvi., 2.

article by the author.[1] This uneven distribution of pressure leads to a rubbing of the inner layers over the outer, and is thought to have an influence on the temporary corneal opacity of glaucoma.

The resistance of the walls to the internal pressure is dependent on their elasticity. Young eyes suffer less from pathological changes of tension than those with old, stiff walls; bulging of the walls on the other hand is more frequent where the resistance of the sclera is less.

The author mentions finally the difficulty which the varying stiffness of the walls places in the way of determining the resistance or internal pressure, and the impossibility of estimating the elastic tension of the walls from the resistance.

VII.—Continued Experiments in the Disinfection of the Edges of the Lids and Conjunctival Sac; the Action of 0.75 % Salt Solution on Micrococcus Pyogenes Aureus.

By Dr. **L. BACH**, Wurzburg.

The author states briefly the results obtained with formol $\frac{1}{2000}$ and $\frac{1}{3000}$. Twelve experiments gave the following conclusions:

Diminution of bacteria on edges of lids, 12 times.

Sterility of edges of lids, ——

Diminution of bacteria in conjunctival sac, 9 times.

Sterility of conjunctival sac, 3 times.

Further attempts with formol were not made as the irritation was so great that it did not seem suitable as a means of preparing the conjunctiva for operations on the eyeball.

The experiments with salt solution substantiated fully the previous results described in the German edition, these Archives.[2]

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[1] "Beiträge zur Augenheilkunde"; Festschrift für Prof. Schnabel; Supplement zu *Archiv für Augenheilkunde*, 1896.

[2] L. Bach, *Arch. f. Augenheilkunde*, xxxiii., S. 1. Antisepsis oder Asepsis bei Bulbusoperationen?

XIII.—A Contribution to the Question of Choked Disc.

By Dr **A. HOCHE,**

Instructor and First Assistant in the Clinic of Psychiatry, Strasburg.

Two theories exist to explain the occurrence of choked disc: one attributes the changes in the nerve to an obstruction in the circulation of lymph, or to mechanical agencies, while the other theory regards the presence of toxic substances in the cerebral fluid as the cause, and is called the inflammatory theory. Certain neurologists occupy the middle ground in that they consider obstruction an essential factor but only when the nerve fibres have suffered from the action of hypothetical toxines. The mechanical theory has gained ground slowly; the chief reason in favor of the inflammatory theory being apparently that its adherents cannot agree to give up the idea of inflammation as applied to the histologic changes in the optic nerve. The question is similar to that of compression myelitis, which in the last ten years has been almost relieved of its inflammatory character.

The purpose of this paper is to point out that with increased intracranial pressure, the optic nerve is not the only degenerated nerve, but that, so far as present investigations go, there are regularly, with choked disc, signs of degeneration in the posterior roots of the spinal nerves.

Up to the present, no case of intracranial pressure with choked disc, examined by the method of Marchi, has failed to show a more or less intense degeneration of the posterior roots of the spinal nerves. In some cases these changes have produced clinical symptoms, but in general a diagnosis could not be made during life. The changes are found at all levels of the cord, least often in the dorsal portion, most frequently in the cervical portion. The passage of the posterior roots through the spinal pia is similar to that of the optic nerve through the lamina cribrosa. The posterior roots are likewise among the paths by which the lymph leaves the spinal cord. The degeneration following cerebral pressure is limited in most cases to the intraspinal part of

the fibres, beginning at the point of constriction produced by the pia; in some cases the change is accentuated at this point; much less often and perhaps under especial conditions such as inanition, the extraspinal portion of the roots takes part in the changes. Naturally the prolongations of the posterior roots, the fibres of the posterior columns, show an ascending degeneration which may be followed to the medulla, and if it exists long enough may produce a condition anatomically resembling tabes dorsalis. How does this degeneration take place? There can be no descending secondary degeneration; the seat of the tumor is a matter of indifference for the occurrence of the changes in question, and moreover there are no fibres descending from the cranium to the posterior roots. There remain, then, the possibilities of an injury by means of a poison circulating in the blood, or, as in the optic nerve, either the influence of toxines or else the increased pressure of the intracranial fluid. For the assumption of a general toxæmia there can be no support in simple tumors of the brain, and the action of toxines cannot be accepted—and here lies the chief value of these findings—for the following reasons: The extraspinal portions of the roots which are bathed by cerebro-spinal fluid are much less involved than the intraspinal portions which are not touched by the fluid. There is no gradual diminution of the condition from above downwards, as would be expected with a gradual diminishing concentration of the toxin-bearing lymph, but the lower part of the cord is more affected, as a rule, than the middle part; finally, there is no inflammation of the roots, but a simple degeneration with the familiar condition of axis-cylinders and myelin-sheaths. There remain, then, as the only possible factor which would produce the condition in the cranium and deep in the spinal canal, the changes in conditions of pressure of the cerebro-spinal fluid. Puncture of the dural sac of the lumbar region has shown that in most cases of cerebral pressure there is present in the spinal canal a pressure of more than 50 *mm* of mercury; the same conditions exist then for the spinal nerves as for the optic nerves and the escape of lymph is hindered in both instances.

It is probable that the constriction which the posterior roots suffer as they pass through the pia divides them functionally from their trophic centres, and the first changes as shown by the method of Marchi indicate this. For the optic nerve, the lamina cribrosa acts in the same manner, and in this connection the trophic dependence of all nerve fibres on the connection with their ganglion cells is important. That pressure at the lamina cribrosa causes degeneration both centrally and peripherally depends simply on the fact that the optic-nerve fibres are in part prolongations of ganglion cells in the retina and in part of those in the brain.

The changes found in recent cases of choked disc are not those of neuritis but such as follow mechanical causes such as pressure.

XIX.—A Contribution to the Surgical Treatment of High Myopia.

By Prof. **CONRAD FRÖHLICH**, Berlin.

In the course of three years I have removed the lens fifty times in the cases of sixteen males and fourteen females whose ages lay between ten and twenty-seven years and whose myopia was from thirteen to twenty dioptries. Twenty cases were bilateral, ten unilateral. Changes in the fundus, except hemorrhages, formed no contra-indication; opacities of the vitreous, however, showed a change in the consistency of that tissue. Among these fifty cases twenty-three had an entirely normal course.

In those cases treated by discission, a Bowman's needle was introduced in the lower outer quadrant of the cornea and a cross made in the centre of the capsule. It is of the utmost importance that the pupil should be widely dilated before and after the operation to avoid the occurrence of iritis, which in one instance led to the formation of a dense secondary cataract. In two cases there was intense pain and tenderness of the eyeball, shallow anterior chamber and narrow pupil, with no injection, lasting twelve hours and following the discission immediately. The outcome was entirely favorable. This condition may have been caused by

the change in the position of the lens. Twice glaucoma occurred, on the third and on the sixth day. Following the advice of Siegrist, atropine was continued for a few days without avail, but the condition yielded promptly to paracentesis.

In certain cases in which linear extraction was performed there were adhesions of the iris or capsule to the corneal wound ten times, iritis with myopia twice, and after the operations for secondary cataract detachment of the retina occurred three times and an increase of the pathological changes in the fundus twice.

The opinion of Pflüger, Mooren, and Fukala has been expressed that the removal of the lens will diminish the tendency to progression in high myopia, but two striking cases of an increase in all the symptoms following successful operations are given.

XX.—Cysts of Krause's Glands.

By Dr. **ISCHREYT**, Riga, Russia.

The scanty literature of this subject is reviewed, the four cases considered by the author as authentic are abstracted, and two new cases described, from which the following conclusions may be drawn:

The cysts of Krause's glands are congenital or acquired. To the latter class belong all the cases which have been carefully observed. They occur between the ages of twelve and seventy-four. The rapidity of growth is variable. In Antonelli's case, for instance, the cyst reached the length of 3 *cm* in three months, while in Stoewer's case, after a duration of two years, the cyst was only 4 or 5 *mm* in size. It is not wise to place too much reliance on the statements of the patient, however, as the condition may give rise to no irritation and remain unnoticed. The site of the cyst is in the fornix, three times in the upper and three in the lower.

In Stoewer's case cysts were present on both sides in symmetrical positions. The conjunctiva has been normal in both cases; in one, mild chronic conjunctivitis, and in another the traces of an old trachoma. Their appearance is that of transparent vesicles from the size of a pinhead to

that of a hazel-nut or larger, freely movable under the conjunctival epithelium. The contents is thin, clear, water-like fluid. The wall of the cyst is composed of a layer of connective tissue from the fibres of the submucous tissue and two layers of epithelium, although this varies as in other cysts. With regard to the etiology of cysts, Virchow mentions three factors: 1. Inflammation which leads to atresia or obliteration of the duct, through adhesion or through contraction of surrounding tissue. 2. Pressure or traction which leads to compression or to bending of the duct, by means of tumors in the neighborhood. 3. Thickened secretion. In the cases described, the second and third factors do not occur, and the conclusion is unavoidable that these cysts are the result of inflammation of the tissues surrounding the ducts. The fact that they do not occur more frequently in the course of various forms of conjunctivitis is attributable to the non-resistance of the glands themselves. In most forms of conjunctivitis they are inflamed, and it is probable that the dryness of the conjunctiva in the late stages of trachoma is due to the destruction of Krause's glands, which would make cyst formation impossible.

XXI.—A Case of Cystoid Formation in the Conjunctiva.

By Dr. **K. RUMSCHEWITSCH**, Kieff.

The case here described belongs to the class formed by the entrance of the contents of the bulbus, chiefly the aqueous, under the conjunctiva. If the origin is a fistula at the margin of the cornea, the cyst covers the neighboring cornea, thus differing from cysts of the conjunctiva proper in the formation of which the ball takes no part. The literature relating to this latter class has been reviewed recently by Rombolotti.[1]

The cornea was rudimentary and covered by a translucent cyst which extended backwards and upwards beneath the normal conjunctiva apparently as far as the fornix, suggesting in its appearance an ordinary serous cyst.

[1] *Arch. f. Augenheilk.*, xxxi., p. 1.

It was noticed at birth, and the eye had caused no discomfort to the twenty-four-year-old patient since then. The eye was enucleated for cosmetic reasons.

The walls seemed to be formed from a prolongation of the sclera and included a space about one third that of the ball. The formation was multilocular, consisting of one large cyst and several small ones. Within the eye the iris and lens were lacking, the optic nerve had a thickness at the scleral opening of less than 1 *mm*, the retina was detached, the vitreous was replaced by fluid which contained no formed elements.

It is not possible to condense the description of the microscopic appearances, which is given at some length. The origin was undoubtedly a marginal ulcer with perforation under the conjunctiva, occurring near the end of fœtal life.

XXII. — A Measure for Combating Infection Following Intraocular Operations.

(Experimental Investigation.)

By Dr. **F. OSTWALT**, Paris.

The author has shown by numerous experiments on the eyes of rabbits the truth of Andogski's statement that the severity of post-operative infection depends partly on the presence of lens fragments. If portions of the lens are in the anterior chamber, the introduction of a virulent culture of staphylococcus aureus produces panophthalmitis; if the lens is intact, the same quantity of infective material will cause plastic iritis, which may end in six or seven days, leaving no trace.[1]

In order to combat the infection, the author introduced into the anterior chamber small flat sticks or bougies of sterilized iodoform, which he kneaded with gum arabic and a little glycerine to the desired size. Each piece contained 20 or 25 *mgm* of iodoform. In normal eyes this caused no reaction; the mass separated by the solution of the gum and the powder remained for four or five weeks at the bottom of

[1] N. Andogski, *Arch. f. Augenheilk.*, xxxiii., p. 11.

the anterior chamber before it was absorbed. Glutol proved too irritating, and salol formed anterior synechiæ.

In eyes which were infected, with intact lens, when the iodoform was introduced immediately after the infection, the process was invariably stopped and the eye restored to a normal state, while the control eye was more or less damaged. When the iodoform was used six or seven hours after infection, the infected eye was healed three out of four times. When an interval of sixteen or seventeen hours had elapsed, with the virulent cultures used, the process had advanced too far to prevent panophthalmitis, but some benefit from the iodoform was apparent in the comparative clearness of the cornea.

When the lens had been wounded and its fragments were in the anterior chamber, the results of infection were too rapid to permit the hope of favorable action.

XXIII.—A Case of Congenital Abnormal Tortuosity of the Retinal Veins of both Eyes.

By Dr. **ARTHUR GLOOR.**

A man, twenty-three years old, came under treatment for chorio-retinitis hæmorrhagica. In both eyes the veins were remarkably tortuous, the condition remaining unchanged after all traces of the chorio-retinitis had disappeared.

Descriptions of similar cases as reported by various writers are given, for which reference must be made to the original.

In the present instance the veins of both eyes were very tortuous, the twisting being apparently only in one plane. In the regularity of the arrangement this case resembles that given in *Oeller's Atlas* (E Table vi), except that in the latter case the arteries were also involved.

The etiology is obscure; the patient has always been myopic. In other cases hypermetropia has been frequent. According to Leber[1] and Frost,[2] if the curves of the vessels are in the same plane there is probably no hyperæmia but a congenital anomaly.

[1] Graefe-Saemisch, vol. v., p. 521. [2] *The Fundus Oculi*, 1896.

REPORT OF THE OPHTHALMOLOGICAL SECTION OF THE 13TH INTERNATIONAL MEDICAL CONGRESS IN PARIS, AUGUST 2–9, 1900.

By Dr. E. BERGER, Paris.

Translated by Dr. Ward A. Holden.

MORNING SESSION, AUGUST 3D.

Pflueger (Berne): **On enucleation and operations intended to take its place.**

Enucleation is a proper operation for many sorts of disease, and in general is to be done in accordance with the classic procedure of Bonnet and Ferrol. In order to obtain better mobility of the artificial eye and to prevent it from lying too deep, one may perform advancement of the muscles according to Schmidt and Pflueger, or produce an artificial stump by introducing a spherical body into Tenon's capsule according to Frost and Lang. The latter is preferably made of gilded silver, hollow, and with perforations through which granulation tissue may enter and finally fill the cavity completely. The cosmetic effect is still better after evisceration of the eye according to Mules, after simple excision of the cornea, and particularly after optico-ciliary neurectomy.

The indications for enucleation are limited not only through cosmetic reasons, but also on account of setting up a meningitis in cases of panophthalmitis, yet panophthalmitis may give rise to meningitis even without enucleation; evisceration also may be followed by meningitis, but less frequently than enucleation. Evisceration is equal to enucleation in preventing sympathetic ophthalmia only when it is performed within three weeks of the injury.

Enucleation is absolutely indicated in malignant tumors of the eye and orbit excepting small tumors of the sclero-corneal

margin, and in cases of sympathetic ophthalmia. Enucleation may be considered in cases of sympathetic irritation, severe injury when conservative methods have been followed for at least three weeks, foreign body in the eye, acute panophthalmitis which has existed 5–6 days, injury from caustic substances when a necrotic destruction of the anterior portion of the ball is feared, and in many cases of congenital glaucoma or of staphyloma in adults.

Evisceration is indicated in cases of panophthalmitis, in most cases of perforating injury, and in many cases of corneal staphyloma. The introduction of a spherical body into the scleral cavity is only to be done in cases in which there is no danger of necrosis of the sclera.

Optico-ciliary neurectomy is indicated in many cases of absolute glaucoma and of corneal staphyloma, and corneal incision or abscision is indicated in cases of corneal staphyloma with preserved perception of light or color, and particularly in cases in which the affection is bilateral.

De Schweinitz (Philadelphia) **discussed the same theme.** He believes that enucleation is indicated in malignant tumors of the ball and in sympathetic ophthalmia, and also in panophthalmitis so long as the orbital cellular tissue is not involved. In the latter case evisceration is preferable. Severe injuries of the eye which are likely to cause sympathetic ophthalmia can only be treated by enucleation if three weeks have passed since the injury. Within three weeks simple evisceration or the Mules operation may be employed. The latter has been followed by sympathetic ophthalmia but once. Evisceration may take the place of enucleation in many cases of staphyloma, painful blind glaucomatous eyes, and non-traumatic iridocyclitis. In the two latter cases optico-ciliary neurectomy also may be performed. In old people enucleation may be preferable to evisceration, since convalescence is shorter. Simple evisceration has but a transient possible cosmetic result; later the stump shrinks and does not afford a proper support for the artificial eye. The results of the Mules method are far better. Since in very many cases enucleation is the only permissible operation, special care must be given to the technique of the operation, the suturing of the divided tendons to the conjunctiva, and to the preparation of the artificial eye.

Snellen (Utrecht), Swanzy (Dublin), and Galezowski (Paris) took part in the discussion. Snellen also believed enucleation to be the best procedure for most cases. The artificial

eyes made by Müller of Wiesbaden, with a double wall and well rounded margins, fit into the conjunctival sac very well and as regards mobility give very satisfactory cosmetic results. Swanzy in general agreed with de Schweinitz.

De Lapersonne (Lille) in cases of panophthalmitis opens the ball by means of the thermocautery. The stump thus formed is well adapted for receiving an artificial eye.

Landolt (Paris) demonstrated enucleation scissors with a double curvature.

Rochon-Duvigneaud (Paris) advised in enucleation dividing the tendons of the recti muscles as near their insertions as possible.

Uhthoff (Breslau), in two cases in which enucleation was done for sympathetic ophthalmia, observed the development of tuberculous basilar meningitis.

Abadie and Darier (Paris) reported cases in which an interstitial inflammation of the orbital tissue after enucleation caused sympathetic ophthalmia, which was cured by inunctions of mercury or injections of antiseptic solutions into the focus of infection.

Gayet (Lyons) considered enucleation indispensable for many conditions; the operations intended to take its place are of less value. In the cases in which death followed enucleation the fatal result must be attributed to the general condition of the patient, and not to the enucleation.

Truc (Montpellier) in cases of panophthalmitis prefers incision or abscission of the anterior half of the ball.

Lagrange (Bordeaux) after evisceration introduces the head of a rabbit's femur into the scleral cavity. The bone disappears through lacunar absorption. Even decalcified round pieces of bone are absorbed, yet in both cases the remaining stump is satisfactory.

AFTERNOON SESSION, AUGUST 3D.

Pechin (Paris): **On traumatic atrophy of the optic nerves.** Pechin reported a case of atrophy of the optic nerve following an injury in the region of the inner angle of the eye without an external wound. Pechin excluded the possibility of an injury of the nerve within the optic foramen and thought that the atrophy was due to the sudden violent stretching of the nerve.

GRANDCLEMENT (Lyons): **On the possibility of curing all diseases of the lachrymal passages without operation, by means of massage and the passage of probes.**

FAGE: **The results of electrolysis in the treatment of dacryocystitis.** Fage uses platinum sounds, which are introduced at intervals of five or six days, the positive pole being placed on the cheek or the side of the nose. A current of six to eight milliampères was used. The electrolysis is supposed to dilate the nasal duct and also have a bactericidal action.

GRANDCLEMENT spoke in favor of, and MENARD and JOCQS (Paris) against, this method.

DE LAPERSONNE and PAIBLEU (Lille): **On the use of abrin in granular conjunctivitis.**

After ophthalmologists had given up the use of infusion of jequirity in the treatment of trachoma because of its great danger, the bacteriologists anew took up the question of its action. Through the labors of Robert, Metschinkoff, Chatenay, Calmette, and others, we have learned that its action depends upon a vegetable toxin called abrin, which strongly excites phagocytosis. In the rabbit's conjunctiva abrin quickly causes migration of multinuclear leucocytes, a casting off of epithelium, and a sero-fibrinous exudation. Similar processes are brought about in granular conjunctivitis. A new membrane is formed in twenty-four hours. Its development may be prevented by the antitoxin serum of Calmette, which has not yet been used clinically. The curative effect of abrin in trachoma is to be explained as being due to the excessive development of leucocytes and the transformation of trachoma granules into scar tissue. The rapid clearing up of the pannus is supposed to be due to the formation of thrombi in the new-formed corneo-conjunctival vessels.

OSTWALT (Paris) has succeeded in graduating the therapeutic action of jequirity. He believes that it is adapted for treating parenchymatous keratitis. LAGRANGE advocates massage in the treatment of granular conjunctivitis.

VIEUSSE (Toulouse): **The treatment of empyæma of the frontal sinus.** In mild cases the rhinitis alone need be treated, in severer cases the passage down into the nose must be probed, for which purpose the sinus must be trephined or its anterior wall removed.

STANCULÉANU and BAUP (Paris): **The bacteriology of empyæma of the accessory cavities of the nose.** From

clinical and bacteriological standpoints two groups of affections may be distinguished. One is the result of diseases of the nasal cavities in which the sinuses contain only the ordinary aërobic bacteria of the nose, and there is no fœtid quality in the muco-purulent discharge. The other is caused by affections of the teeth, and is characterized by the predominance of anaërobic bacteria (bacillus serpens, perfringens, ramosus, etc.), and by the fœtid odor of the pus.

TERSON (Paris): **On hemorrhages into the vitreous in the course of cerebral hemorrhages.**

JATROPULOS (Constantinople): **On a case of unilateral retinitis proliferans, caused by the entrance of cerebro-spinal liquid into the region of the disc.**

ARMAGNAC (Bordeaux): **On congenital purulent inflammation of the eyes developing before birth.**

SCRINI (Paris): **On the advantages of oily collyria.** These keep longer, are more aseptic, and are more efficacious in their action than aqueous collyria.

CHEVALIER (Le Mans) spoke on the same subject.

MORNING SESSION OF AUGUST 4TH.

UHTHOFF (Breslau) discussed **toxic optic neuritis.**

The clinical and anatomical study of these affections is now sufficiently advanced to enable us to classify them. The most essentially different forms are alcohol and tobacco amblyopia on the one hand, and quinine amaurosis on the other.

In the former group there is the clinical picture of a retrobulbar partial optic neuritis with a central scotoma and normal limits of the field. The anatomical changes are limited to the papillo-macular bundle of fibres. The inflammatory symptoms are for the most part slight, atrophic changes are seen only in the temporal half of the disc, and changes in the retinal vessels and perineuritic symptoms with an involvement of the subdural fibres are rare. In this group belong the visual disturbances due to alcohol, tobacco, bisulphide of carbon, arsenic, iodoform, and hashish. From a clinical point of view we may add the visual disturbances of diabetes mellitus, and those of some auto-intoxications: gout, cancer, pregnancy, lactation, parturition. The latter not infrequently give rise to multiple peripheral neuritis.

The second group is characterized by the existence of vascular changes, diminution of the calibre of the vessels, and necrosis in

consequence of ischæmia and of the toxic effect on the nerve elements. To this group belong quinine, salicylic acid, male fern, pomegranate root. There is excessive contraction of the visual field, but never multiple peripheral neuritis. The narrowing of the retinal vessels alone cannot explain the changes in the nerve, for in ergotin poisoning the former exist without the latter.

The clinical and anatomical changes in lead poisoning are characteristic, and form an intermediate variety between the two main groups. There are pronounced inflammatory changes in the optic nerve, of varying location, and frequently the vessel walls are diseased.

The visual disturbances due to nitrobenzin, anilin, serpent poison, and gout are not typical, and their classification is not yet possible.

Many auto-intoxications seem never to give rise to pathological changes in the optic nerves. Such are the auto-intoxications due to affections of the thyroid gland, the pituitary and suprarenal bodies, and the liver, cachexia strumipriva, icterus, Addison's disease, and Basedow's disease.

The question whether exogenous or endogenous intoxication may cause a simple atrophy of the optic nerves, such as that occurring in tabes, is to be answered in the negative. The changes in the optic nerves due to gout most resemble those due to tabes, yet there are important differences between them. In the intoxications there are always neuritic symptoms, disease of the vessels, or affections of the nerve sheath. In typical tabic atrophy, on the contrary, inflammatory signs are wanting, and reports of the clinical observation of inflammatory changes in the disc in the beginning are of questionable accuracy. In the intoxication amblyopias Uhthoff found anatomically, besides the purely atrophic changes, an interstitial neuritis. It is possible that a process originally inflammatory may secondarily cause a simple atrophic degeneration of the optic-nerve fibres.

The explanation of tobacco amblyopia as being due to primary changes in the centre of the retina with an ascending secondary degeneration of the nerve is untenable. The changes in the nerve-fibre and ganglion-cell layers found in these cases are due to a descending degeneration. In many of the intoxications produced experimentally the affection may begin in this manner, but surely not in alcohol and tobacco amblyopia.

The frequency of multiple peripheral neuritis in the intoxica-

tions which give rise to central scotoma is remarkable. Such, for example, are alcohol, arsenic, bisulphide of carbon, and lead. In nicotine poisoning alone of all these intoxications has multiple peripheral neuritis never been found. On the other hand, there are intoxications which cause multiple peripheral neuritis, but do not cause central scotoma. Such are those produced by silver, mercury, and copper. One must suppose that many intoxications especially predispose to optic-nerve affections, which usually are bilateral.

The toxic substances which cause visual disturbance chiefly through the medium of vascular changes appear, on the contrary, never to be complicated with multiple peripheral neuritis. Such are quinine, salicylic acid, etc.

The question whether an affection of the optic nerve begins in the interstitial tissues or has its origin in the nerve fibre itself is difficult to answer. Uhthoff differs with those authors who, like Weigert, maintain that the interstitial inflammations, such as hepatitis and nephritis, always are in the beginning of a parenchymatous nature. In the case of the optic nerves, the clinical examinations of the light sense, color sense, and visual field give us much information to guide us in distinguishing processes which begin in the optic-nerve fibres from such as begin in the interstitial tissues. In certain stages of the disease such a differentiation may, it is true, be very difficult.

Infectious optic neuritis doubtless belongs in the category of toxic affections of the optic nerve. Uhthoff found in the entire literature only 221 cases of this sort: 21 in influenza, 3 in syphilis, 20 in rheumatism, 16 in malaria, 15 in typhus, 14 in erysipelas, 10 in measles, 8 in diphtheria, 6 in polyneuritis, 5 in variola, 5 in recurrent fever, 4 in scarlatina, 3 in tuberculosis, 2 in gonorrhœa, 2 in typhoid, 1 in beri-beri, 1 in acute articular rheumatism, and 1 in varicella. A large number of infectious diseases, such as dysentery, cholera, splenic fever, and rabies, have not given rise to this affection. This form of toxic affection of the nerve is, however, rare in comparison with the great frequency of the infectious diseases. Characteristic of these is the existence of a central scotoma that is complicated with peripheric contraction of the field more frequently than is alcohol and tobacco amblyopia. The ophthalmoscopic changes are usually more pronounced in the former than in the latter. In the infectious optic-nerve affections one finds not infrequently choked disc, neuro-retinitis, or

neuritic atrophy. Although in most cases this is bilateral, it is unilateral more frequently than is alcohol-tobacco amblyopia. These optic-nerve affections occur only in such infectious diseases as predispose to multiple peripheral neuritis.

NUEL (Liege) discussed the same subject, but in an essentially different way. In the pathological investigation of diseases of the optic nerves hitherto not enough attention has been paid to the finer anatomical structure. One still finds the view expressed that in affections of the optic nerve the hypertrophied interstitial connective tissue causes destruction of the optic-nerve fibres by pressure. No attention has been paid to the changes in the neuroglia which, like the nerve fibres, is derived from the ectoderm.

Nuel's investigations have led him to believe that every neurotic affection of the optic nerve first causes changes in the nerve fibres, and only secondarily changes in the interstitial tissues, the neuroglia and the connective tissue, and in the vessels. In many cases it would seem that the interstitial tissue presents evidences of proliferation, brought about because the nerve fibres have been destroyed, although in other cases it would seem that there is an irritative proliferation process in the former. Yet never are changes demonstrable in the interstitial tissue without there being an affection of the nerve fibres, probably primary. In the later phases of optic neuritis the hypertrophy of the interstitial tissue involves chiefly the neuroglia, and where, on the contrary, there is hypertrophy of the connective tissue there appear to have been unfavorable nutritive conditions for the former, which proliferated primarily. There is no optic neuritis without proliferation of neuroglia; but the new neuroglia very readily degenerates, and then the connective tissue takes the place of both neuroglia and nerve fibres. This degeneration of neuroglia may occur in the beginning of the process. An exudation of leucocytes may be altogether wanting, or may occur only in the later course. In infectious optic neuritis leucocytes are more likely to be present. This has no histogenetic significance. The leucocytes break down and are absorbed. The neuroglia in the inflammatory affections of the optic nerve plays the same rôle as the interstitial connective tissue in other organs; both react in parenchymatous affections with a proliferation of the fibrous and cellular elements. This is particularly well seen in the examination of many toxic affections of the nerve (optic neuritis from male-fern poisoning), yet one can explain in the same way the changes found in cases of alcohol

and tobacco amblyopia. Furthermore Weigert found the same conditions in diseases of the central nervous system, and it must be remembered that the optic nerve corresponds in structure to the central nervous apparatus, and not to the peripheral nerves.

Nuel's results are not in accord with the current view that there is an interstitial optic neuritis differing from the "parenchymatous" optic-nerve atrophy in tabes, which is a simple degeneration of the optic-nerve fibres. Parenchymatous optic neuritis is scarcely spoken of in the literature.

The ideas hitherto current as to the nature of the diseases of the optic nerve have been wrong because the examinations in such cases were made only at an advanced stage. For a rational classification, however, we must take into consideration the changes observable in the earliest stages. The existing results of pathological investigations of optic neuritis must be carefully gone over, particular attention being paid to the changes in the neuroglia, and the parenchymatous optic neuritis will be recognized in place of interstitial optic neuritis as the usual form of inflammation of the optic nerve.

Also, the idea that the hypertrophic interstitial connective tissue can compress the optic-nerve fibres, must be given up. No bundle of optic-nerve fibres is surrounded, ringlike, by interstitial connective tissue (the lamina cribrosa being left out of consideration); and only in advanced stages could such compression possibly occur. In the cases of fairly acute optic neuritis, however, the liquid in the œdematous nerve may separate the bundles of fibres from the connective-tissue septa, and in this stage one can already discover changes in the nerve fibres.

It is not proper to attribute the rôle which one formerly regarded as belonging to the interstitial tissue now to the neuroglia, in the pathogenesis of optic-nerve diseases, for the changes in the neuroglia appear later than those of the nerve fibres. The only variety of parenchymatous optic neuritis that has been carefully studied in all its stages is that caused by male-fern.

Nuel regards tabic optic-nerve atrophy also as a parenchymatous neuritis with consequent glyosis of the fibres. The secondary degeneration of the optic nerve is only a special form of parenchymatous neuritis in which there are changes both in the optic-nerve fibres and in the neuroglia. The toxic affections of the optic nerve following panophthalmitis show clearly the symptoms of an acute parenchymatous neuritis with interstitial œdema,

degeneration of the neuroglia, etc. In all probability to this group belongs also the optic atrophy with mother-of-pearl colored disc, which follows orbital affections, such as abscess, tenonitis, erysipelas, and the like.

Retrobulbar neuritis also, whether due to bacteria or not, should be classed with the parenchymatous affections of the nerve.

The optic neuritis which is due to lymph stasis in the optic nerves in cases of cerebral disease, tumors, and the like, also shows all the signs of parenchymatous neuritis; the interstitial œdema causes changes in the nerve fibres, and finally destroys them; the neuroglia becomes hypertrophied and shows an increase in the number of its nuclei (Rochon-Duvigneaud), yet the increase in neuroglia is in no way the cause of the destruction of the fibres.

Furthermore, the descending simple atrophy of the clinicians, which follows compression of the central portions of the optic fibres, appears, in many cases at least, to belong to the parenchymatous affections.

GALEZOWSKI: **On the syphilitic affections of the retina and their treatment.** Galezowski observed in the course of ten years 558 cases of this sort; the affection appeared from two to fifteen, and in exceptional cases twenty-five, years after the initial lesion. Recovery took place after mercurial inunctions had been employed for two or three years.

FALCHI (Paris): **On the ocular pathology of the fœtus in hereditary syphilis.**

ANTONELLI (Paris): **The ophthalmoscopic symptoms of hereditary and atavistic syphilis; new contributions.**

ZANOTTI (Vercelli): **On amaurosis and amblyopia due to kidney stone and an acute optic neuritis in the uric-acid diathesis.**

(*To be continued.*)

REPORTS OF MEETINGS OF THE SECTION OF OPHTHALMOLOGY AND OTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. J. HERBERT CLAIBORNE, Secretary.

I.—MEETING, MONDAY EVENING, OCTOBER 15, 1900.

The minutes of the preceding meeting were omitted by order of the President.

Pres. P. A. Callan in the chair.

Dr. J. O. Tansley presented a case illustrating **Harlan's new operation for prothesis.** He performed the operation as described by Harlan, a lead wire being used somewhat after the manner of a seton, pushed under the conjunctiva at the inner third of the lower lid, passed toward the external canthus, curved around and passed outward again about the outer third of the upper lid, reinserted once more and brought out at the inner canthus; the terminal end of the wire curves downward and crosses the wire at its commencement. At the end of three months it is customary to take out the wire and insert a lead shell. Dr. Tansley described the technique at length. The result at the time of the showing of the case was very good. Dr. Tansley said the sac was much larger than it had been.

Dr. John E. Weeks said he had done two or three of these operations after the manner of Harlan, but would never do them any more; the results, in his opinion, were at first good but subsequently bad. In his experience the sac was almost always obliterated again. He thought the restoration of the sac could be more successfully done by grafts. His opinion of the case exhibited by Dr. Tansley was that in twelve months there would be a shallow sac again. Dr. Chambers said he had not done this operation, but had done a number by the Thiersch graft method;

at the end of a year he had found but a small result to follow even the method of Thiersch.

Dr. T. R. POOLEY described a case of **emphysema of the lid and orbit.** There were the classical symptoms of emphysema, namely, crepitation, œdema, ptosis. The interest in this case was in the fact that there was no history of trauma. There were three or four attacks which had been preceded by violent sneezing and blowing of the nose. A compress bandage was used, and there was rapid recovery from each attack. Dr. Pooley referred to the fact that in all cases with which he was acquainted, in his own experience and in literature, there had been a history of trauma; in this case the minutest cross-questioning failed to bring out any such history. Inspection of the nose revealed a slight deflection of the septum, but no necrosis. He considered the case unique.

Dr. HOLDEN remarked that rhinologists had mentioned such cases in ethmoid disease.

Dr. H. H. TYSON described a case of **aniline pigmentation of cornea and conjunctiva;** the case was not present, but several drawings were shown illustrating the changes made. The patient was an Italian boy five years old. About ten days previously he had, for some unknown reason, rubbed the point of an aniline pencil upon the inner side of the lower lid of the left eye; the lid immediately became discolored. The boy liked the appearance of the eye so much that he rubbed the pencil some more upon the lid of the eye; judging from the appearance it must have been used very thoroughly. The parents tried to remove the discoloration by washing, but without success. The following day the eye was painful and swollen. The physician in the town in which the people lived prescribed boric acid; no improvement resulting from the use of this, the boy was brought to New York City. When Dr. Tyson saw the case the following conditions existed: The eye was closed; lid intensely swollen with a hard mass the size of a cherry in the central portion of the lid; there was bluish discoloration of the skin of the lower lid, the edge of the lid being violet color; the edge of the upper lid was red and congested. The upper lid was very little swollen. The palpebral portion of the conjunctiva of the upper lid was congested; the lower lid was deeply pigmented and violet over its entire extent, the darkest color being over the centre of the lid. In the ocular conjunctiva there wasdeep violet discoloration of the entire

surface with the exception of the upper-outer portion, which was congested and ecchymotic. There was profuse lachrymation and the bandage was colored violet. The cornea was hazy and stained a violet brown. There was ciliary congestion ; the iris could be seen with difficulty only under strong illumination. The iris was of a brown color, and the pupil contracted slightly and sluggishly to light. The color of the iris of the good eye was naturally brown. A brown fibrinous membrane extended across the anterior chamber, the lower edge of the pupil dipping behind a pigmented hypopyon of a greenish-brown, metallic lustre. No reflex from the fundus. Tension and motility normal. Could count fingers at eighteen inches. Complained of slight pain and photophobia. Atropin was used and the pupil dilated moderately in an hour. He was put in a dark room and hot boric-acid fomentations prescribed. The pigment was gradually thrown off.

The patient was first seen on October 3d ; on October 15th the condition of the eye was worse ; the stain had, however, almost entirely disappeared with the exception of a small patch in the centre of the lower lid ; the cornea was hazy ; there was a corneal staphyloma of the lower portion over the site of the former hypopyon. Tension normal. Patient complained of continued lachrymation but no pain. Bandage still stained violet color. The parents had not noticed the bulging of the cornea until their attention was called to it.

Dr. KNAPP said that he had seen but one case with marked symptoms similar to the case of Dr. Tyson, which he had examined. He had, however, also seen several times aniline stains of the cornea and conjunctiva, but they had been evanescent and presented no notable tissue-changes.

Dr. WEEKS had seen a case in a child of five, in which the point of an aniline pencil had lodged in the conjunctival sac, causing a deep violet stain of the conjunctiva and cornea ; there was some swelling. After ten days the symptoms had cleared away ; atropin had been used. Dr. CALLAN asked Dr. Tyson why he had used a compress bandage. Dr. TYSON replied that he had used it to give the eye rest. Dr. CALLAN thought the case would have done better without the bandage. Dr. POOLEY asked about the line which could be seen in the picture at the lower half of the cornea. Dr. TYSON said that was hypopyon.

Dr. HERMAN KNAPP presented the brain of a patient on whom he had made some remarks in March at the meeting of the Section.

The patient was supposed to suffer from **thrombosis of the cavernous sinus in consequence of a traumatic hematoma.** An operation was performed by Dr. Frank Hartley and the diagnosis of thrombosis was confirmed. The tumor, however, assumed more and more the character of a sarcoma, to which the patient succumbed May 16th, about six months after the injury and two and a half months after the operation. The tumor proved to be a small, round-celled sarcoma ; it had invaded the upper lid and adjacent tissues, destroying the contents of the orbit, eroding the horizontal plate of the frontal bone, and, penetrating into the skull, had affected the dura of both sides and extended across the cribriform plate to the opposite side. It had also attacked the adjacent frontal lobes and had migrated into the left optic nerve, the left half of the chiasm, the left optic tract, and the crossed fascicles of the right optic tract. The right optic nerve in its intracranial portion proved normal up to the chiasm, but beyond that only of the crossed fascicle of the tract was reddish discolored, the same as the whole left optic nerve and tract. The lateral fascicle of the right nerve throughout its whole course in the skull was normal, and distinguished by a sharp line of demarcation from the crossed fascicle in its course behind the chiasm. This may be considered an anatomo-pathological demonstration of the semi-decussation of the optic-nerve fibres in man.

The case was published in part in the *Trans. Am. Oph. Soc.*, 1900, and in full in the ARCH. OF OPHTHAL., vol. xxix., p. 463, 1900.

Dr. W. B. MARPLE showed a case of a man from whose bulbar conjunctiva toward the inner canthus, near the sclero-corneal margin, he had removed a tumor. It had been supposed to be a **sarcoma of the limbus** but microscopic examination showed it to be a **carcinoma.** The case still showed clearly the point at which the tumor had been removed, and where there was a considerable excavation of the conjunctiva. Dr. Marple desired the opinion of those present as to the advisability of removing the entire eye. The case also showed a slight sore on the left cheek which had not been examined microscopically. Dr. WEEKS asked about the character of the sore on the cheek and how long it had been observed. The patient said it had been observed for the same length of time as the appearance in the eye ; namely three or four months. Dr. KNAPP advised removal of the eye. Dr. WEEKS said that if the tumor had proven to be a papilloma he would have

suggested simply removal of the tumor ; inasmuch as it had been found to be a carcinoma he would suggest the removal of the eye. Dr. POOLEY advised exenteration of the entire orbital contents.

II. — MEETING, MONDAY EVENING, NOVEMBER 19, 1900.

Dr. T. R. POOLEY moved, and it was seconded, that fitting resolutions be drawn up on the death of Dr. H. D. Noyes, a former member of the Academy of Medicine ; to this end the president appointed Dr. H. Knapp, Dr. D. Webster, and Dr. J. E. Weeks.

Dr. H. KNAPP made some remarks on **punctate cauterization in the infiltration zone of ulcers and abscesses of the cornea.** He referred to the former treatment by paracentesis and the Saemisch section, but thought that galvano-cautery was preferable. He had been accustomed to make application in the centre of the ulcers and abscesses, but it seemed best to him, from his experience as demonstrated in the cases to which he referred, to make it in the form of punctate cauterizations in the periphery. He pointed out that the Saemisch section often caused anterior synechiæ and an ugly scar. By the punctate cauterizations he had treated about eighteen cases, with encouraging results in practically all of them. He thought in this way much tissue was saved, and he presented the idea that the points of cauterization acted as drainage pits by opening the cornea and allowing the infiltrated material to pass outward according to the law of least resistance. He found the reaction small and slight, and that the patients did best in bed and with eyes bandaged. He uses the red heat instead of the white heat, and performs the cauterizations in rapid succession, pausing and instilling holocaine or a weak bichloride lotion, in order to prevent heating the aqueous humor. In cases which were associated with dacryo-cystitis he thought it best to open the sac and destroy the mucous membrane. To illustrate his method he presented and demonstrated two patients with corneal abscess on which he had operated.

Dr. POOLEY said he had had no experience with this use of the cautery, but had made considerable use of the cautery and also of Saemisch's section ; he had, however, been accustomed to use the Paquelin and not the galvano-cautery. Dr. WEEKS had had no experience with this method of cauterization but had used the cautery, likewise carbolic acid pure. Dr. CALLAN remarked that he had been accustomed to destroy the tissue of the infected area, but had never touched, nor caused any affection in, the anterior

capsule, and when this condition was found he did not think it was due to the cautery. He referred to the fact that there are many cases of ulceration of the cornea associated with diabetes and albuminuria, both of which the cautery did not cure. He considered that these two conditions, also the age and condition of the patient, had to receive due attention. Dr. KOLLER asked Dr. Knapp if he emptied the hypopyon; Dr. KNAPP said he did not. In extreme cases Dr. Knapp said he had had the best results from this method.

Dr. J. E. WEEKS showed a case of **gumma of the sclero-corneal margin**; there were adhesions between the iris and capsule; the eye was extremely red. He had used hot applications and vigorous anti-syphilitic treatment, under which the case improved. There was also occlusion of the pupil. He referred to a case somewhat similar which he had seen in 1892, and which he had at first diagnosed as sarcoma, but afterwards discovered to be syphilis, which had rapidly recovered under proper treatment.

Dr. WEEKS presented a **specimen of a tumor of the brain.** The tumor was shaped like a cone, the base being at the cortex and the apex at the corpus callosum. The base was slightly elevated from the surface of the brain. It involved the anterior parts of the first and second portions of the occipital convolutions, the angular and supra-marginal convolutions, and a portion of the supero-parietal convolution. It was a round-celled sarcoma. The patient was a woman, forty-eight years of age, who had had an epileptiform seizure in May, 1899, followed by an attack in June of the same year. Aphasia was noticed at this time, but it gradually disappeared. In January, 1900, she had much general headache, with nausea and vomiting in the morning. Her gait was regular. In February, 1900, vision began to fail in the left eye; by April she was blind in both eyes with violent optic neuritis. Attempt to localize the growth by means of the X-ray failed. July 14th, mental hebetude supervened, and a chronic spastic conjugate deviation of the eyes to the right side was observed. Diagnosis, *tumor of the left occipital lobe.* Patient died July 19, 1900.

Dr. J. HERBERT CLAIBORNE presented a man, forty-nine years old, who had a case of orbital tumor. Two and a half years ago he noticed a lump in the inner corner of the right eye; about one year afterward he was operated upon by an external operation in which an incision was made from the corner of the eye

down through the ala of the nose, exposing the nasal cavity, and a part of the tumor was removed for microscopical examination. Ten months after this the eye commenced to be very prominent and to be displaced outward. At the time of presentation Dr. Claiborne pointed out that the eye was prominent and displaced downward and outward; movements all limited, mostly upward and inward. The upper lid was slightly swollen, particularly over the inner canthus where a soft tumor could be felt, which retreated and yielded somewhat to pressure. The cornea was normal, as was also the pupil. The ophthalmoscope showed a dim fundus, no optic neuritis; vision, $\frac{20}{100}$; the patient was not intelligent, spoke dialectic German, and no definite statement could be obtained. Tension normal. Inspection of the right side of the nose revealed a nodular tumor projecting almost to the anterior nares. It was covered with a whitish, glairy mucus or pus and easily bled on pressure with a cotton-armed probe. Three sections of this tumor were removed and studied under the microscope by Dr. E. B. Coburn who pronounced it to be a papillary-adenoma. The left nostril was filled by a polypus and by another tumor which appeared to have the same characteristics as the one on the right side. Examination of the post-rhinal region could not be made. The patient complained of very little or no pain. Dr. Claiborne presented the case with a view to eliciting the opinion of those present as to whether it was operable or inoperable. In his opinion the case was inoperable although the microscopic examination had not declared it to be malignant.

Dr. T. R. Pooley read the paper of the evening on **the treatment of trachoma by expression, with special reference to recurrence of the disease.**

Dr. Pooley referred to the almost universal tendency of the minds of the profession to exaggerate the value of remedial procedures notwithstanding the many instances in which disappointment had resulted after more mature deliberation and experience. He referred to the numerous methods employed to cure trachoma; among the surgical methods he dismissed grattage in a few words describing it as the last and worst, and after a passing reference to the galvano-cautery, electrolysis, curetting, and peritomy, he took up the operation for trachoma by means of the roller or other forceps. He said that of all the procedures expression had by far stood best the test of time and experience; he said, however, that it was only applicable to that form of granulations

described by Knapp as simple or non-inflammatory trachoma. This form presented itself without symptoms of discomfort or inflammation, except of a trifling kind, and always showed the hyaline, sago-like granulations of the retrotarsal fold and palpebral conjunctiva, while there were none on the fornix or bulbar conjunctiva.

Dr. Pooley took up the statistics of the New Amsterdam Eye and Ear Hospital between the years 1899–1900, during which time 106 operations for trachoma were done by himself and his colleagues. Many of these patients disppeared in a few weeks after operation and were lost to observation; therefore in many cases he could not say whether complete recovery had been achieved, but of those who had remained under observation, in ten cases there had been severe relapses; in two of these ten secondary operations had been done which were again followed by relapses. Two of the worst cases of recurrence of the disease, in fact the last two just mentioned, were inmates of an institution for the care of children, and the disease may have been aggravated by contamination by another case of infectious type. In each case the treatment not only did no good but the relapse was worse than the original attack. In one case there was an immense amount of swelling and hypertrophy of the conjunctiva, and the trachomatous process developed again almost under the eye of the observers. These figures show little more than 90% of improvement or recovery. Dr. Pooley referred to a statement made by himself in a lecture before the N. Y. Polyclinic, 1892–93, to the effect that the cure of a disease like trachoma, which is essentially a chronic one, in a single operation the duration of treatment being only two or three weeks, is certainly a marvellous improvement upon the old methods. In 1892, in the 27th Annual Report of the American Ophthalmological Society, Knapp wrote: "This method triumphs in the case of densely packed, spawn-like granulations before the cornea is affected and scars form. These cases are completely and permanently cured in one sitting. . . . The other forms of trachoma where there is more or less inflammatory secretion of the conjunctiva or distinctly hyaline infiltration between cicatricial tissues are also greatly benefited by the squeezing, but in these cases it is advisable to let the operation be followed by the application of nitrate-of-silver solution or the sulphate-of-copper crystal." In the discussion which followed, the optimistic character of these statements seemed to be generally supported. Dr.

Knapp had seen reason to modify his opinion in regard to the value of this mode of treatment, and in a later publication he said: "I may say that the mechanical treatment of trachoma does not supersede the medicinal, which supplements it most beneficially in abridging and facilitating recovery. Expression does this efficiently and more gently and with better preservation of the conjunctiva than all the other methods."

Dr. Pooley referred to the method of operation and said he had been accustomed to apply the solid stick of copper sulphate immediately after the operation, rubbing it in thoroughly, but had since abandoned this and resorted entirely to the roller forceps devised by Dr. Knapp. In removing the granules from the angles he had found cilia forceps to be the more useful. Both eyes are operated upon at the same time and the patient allowed to go home without a bandage, cold compresses and washes being used at home. In most instances it will be found that for a few days after the operation the conjunctiva will be covered with mucus or coagulated fibrin. Immediately upon the subsidence of the symptoms the lids should be gently touched with sulphate of copper two or three times a week and this should be continued so long as there is any hypertrophy of the conjunctiva remaining. In no case can the cure be considered as effected when the operation is done; it must be supplemented by local treatment for a varying period, according to circumstances.

Dr. Pooley summarized his conclusions as follows:

1. Of all the mechanical methods which have been devised for the treatment of trachoma, it may be said that expression in suitable cases is the most efficient remedy yet discovered, effecting in a large percentage a more or less complete cure with better preservation of the conjunctiva than any of the other methods heretofore described.

2. It must, however, in every instance be carefully followed up by local treatment until tendency to relapse has disappeared.

3. The success of the method depends upon the conscientious removal, so far as possible, of all the trachomatous bodies without injury to the conjunctiva.

4. In any event, so far as the writer's experience goes, more or less frequent relapses will occur.

Discussion.—Dr. H. KNAPP said he practically concurred with Dr. Pooley in every point. At first he thought the operation of expression was a permanent cure, but soon found relapses which

suggested after-treatment. He has come to the conviction that at times there are spontaneous cures of trachoma, and referred to the same belief which he had heard expressed by our colleagues in Moscow, Russia. He thought expression was indicated wherever gelatinous material was present. For follicular trachoma in the cicatrizing stage he was accustomed to use a smaller pair of forceps. In the benign folliculous conjunctivitis he uses bichloride of Hg 1 : 1000. Dr. SKEEL agreed with Dr. Pooley also, and had used the forceps of Knapp, Noyes, and Prince ; he likes Prince's best and prefers Knapp's to Noyes's. Dr. WEEKS agreed largely with Dr. Pooley, but was accustomed to operate even when the case had passed beyond the classical stage for operation referred to. He said trachoma was divided into three classes : the first, in which there were discrete granulations and no secretion ; the second, in which there was considerable secretion —those cases caused contagion unless isolated ; and a third class which were confluent from the very beginning and very inflammatory. He thought the first class would recover without scars, and was the best form for operation ; the second and third he thought would go on to the formation of scars. Dr. Weeks spoke somewhat in favor of scarification ; he said it must be done superficially and follow expression. He thought it hard to get at the granules in the caruncle, and considered Noyes's forceps the best for this purpose. He thought it was probable that trachoma was due to a micro-organism, if so a germicide was indicated ; he was accustomed to use bichloride, 1 : 1000 and 1 : 500, putting it on with a brush or a probang, after the operation. In case of swelling he uses ice applications. Since 1896, when he adopted this method, he has had no relapses. Dr. REESE supported Dr. Weeks's view regarding relapses. Dr. CLAIBORNE said he had been accustomed to operate in the class of cases indicated by the gentlemen who had spoken, but that he had also been accustomed to operate in cases in which others had seen contra-indication for operation—to wit, in those cases known as horny granulations. He had attempted this in one case and found immediately after the operation that the eye was reinfected and the condition much worse, but under the constant application of bluestone the eye recovered rapidly, whereas it had resisted for months the use of bluestone. He had repeated this success, and feels convinced that while the cases are made apparently immediately worse, recovery under bluestone is ultimately facilitated.

He considered expression indicated in these cases. Dr. CALLAN had looked over the cases in an orphan asylum which had been operated upon by grattage when it was en vogue; he could pick out the cases in which this method had been used. In the velvety form of trachoma he used scarification followed by copper sulphate. He had been using this for years, and thought it useless to apply any other form of treatment than scarification to the velvety form. Dr. KOLLER expressed his opinion that it was dangerous to operate in cases in which there had been atrophy of the conjunctiva; he considered operation distinctly contra-indicated in these cases. Dr. MARPLE wished to say that while he had been an advocate of grattage originally he had ceased to employ it after six months' experience.

Dr. POOLEY closed the discussion, saying he felt gratified at the extensive discussion of his paper; he thought it was very difficult for many observers to be honest in regard to their results. He never scarified the conjunctiva, and thought the best results were obtained in true trachoma. Of all the forceps he considered Dr. Knapp's by far the best. All things being taken into account, he thought he could draw a just conclusion that the safest and most reliable remedy, if the most tedious, was the use of crystals of copper sulphate.

REPORTS OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By C. DEVEREUX MARSHALL.

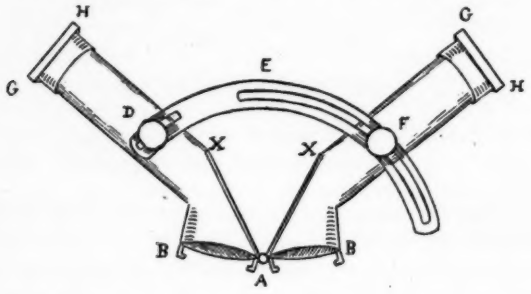
OCTOBER 18, 1900, G. ANDERSON CRITCHETT, M.A., F.R.C.S.E., PRESIDENT, IN THE CHAIR.

Mr. C. WORTH read a paper on the **orthoptic treatment of convergent squint in young children.** He said that the treatment adopted by most surgeons in cases of convergent squint was as follows: Glasses were ordered to be worn constantly. In nearly 30 % of constant monolateral squint the eyes after a time become "straight" and remain so while glasses are worn. Some of them acquired binocular vision and were really cured. The majority were not. In the 70 % which are not "cured" by glasses alone, the patients are usually left without further treatment till the age of seven or eight years, when most of them are operated upon. But only a very small proportion will then ever get binocular vision. The time has gone by when this might have been easily established in suitable cases.

There are other difficulties in the way of orthoptic treatment of squint in young children: 1. The child will only submit to treatment so long as he finds it interesting. 2. The suppression of the vision of the squinting eye. 3. The angle of the squint is usually so great that an ordinary stereoscope could not be used, even if there were no suppression.

In 1895 Mr. Worth made the instrument shown in the drawing with the object of overcoming these difficulties. The instrument consists of two halves joined by a hinge at A. Each half consists of a very short tube joined to a longer tube at an angle of 120°. At AX is an oval mirror. At GH in each tube is

placed a glass picture-slide. At AB is a lens whose focal length equals the distance of the reflected image of GH. In addition to these lenses, there are slots at AB into which lenses, from the trial case, may be put, to correct the refractive error of the patient. D E F is a brass arc with two slots in it — a short slot in which is the binding screw D, and a long slot in which is the screw F. When the screw F is loosened, the two halves of the instrument may be brought together to suit a convergence of the visual axis up to 60°, or separated to suit a divergence of as much as 30°.



When the screw F is tightened and D is loosened, an amplitude of movement of about 10° only is permitted.

He finds that those that see binocularly naturally arrange themselves into three separate and distinct classes according to the degree in which they possess this faculty. These grades of binocular vision may be called :

1st Grade. Simultaneous macular perception.

2d Grade. True fusion with some amplitude.

3d Grade. Sense of perspective.

Before beginning treatment he ascertains the visual acuteness of the child's squinting eye by means of a series of little ivory balls.

The instrument is then adjusted to suit the angle and direction of the squint, and a cage, for instance, is shown before the fixing eye and a bird before the squinting eye. The child sees only with the fixing eye. Illumination of the slide before the squinting eye is increased and that of the slide before the fixing eye diminished till the child sees the bird he was told to look for. He has now usually lost sight of the cage. Illuminations are then readjusted till the child sees the bird in the cage. Many similar designs are then shown. Then he is shown a series of

slides which require blending of the images. He soon learns to do this (Grade 1). After a time it is found that the angle of the instrument may be altered very slightly without the fused picture coming to pieces; the eyes follow the objects and maintain fusion (Grade 2). Exercises are continued with slides till the tests show that Grade 3 has been reached.

The next thing is to gradually equalize the illumination of the object slides. This may be done at this stage without a return of the suppression. Next an attempt is made to separate the mirrors more and more while the visual axes follow the direction of the objects.

Mr. Worth has used this treatment in some hundreds of cases, and, in a considerable proportion, exercises and the use of glasses have caused a disappearance of the squint and the acquisition of the highest grade of binocular vision.

In other cases, though patients have Grade 3 while looking into the instrument, the squint does not disappear. An occasional visit is quite sufficient to preserve the fusion faculty till an appropriate age for operation has been reached. The desire for fusion then overcomes any slight defect that may remain, and a perfect cure results.

This treatment, of course, fails in those cases in which the deviating eye is too blind, and in those in which there is a congenital absence of the potential faculty of fusion.

The special points of this instrument are: 1. Its adaptability to a squint of any degree or direction, including those cases in which the globe is rotated about an antero-posterior axis. 2. Suppression of vision of the squinting eye is quickly overcome by unequal illumination. 3. The variety of devices shown in the instrument interests and amuses the child so that he will readily give all the help he can.

E. NETTLESHIP—Cases of **blindness from bullet wound of the orbit.**

Mr. Nettleship read this paper, in which he gave details of six cases in which the sight of one or sometimes of both eyes was lost or injured by the passage of a bullet through the orbit without wounding the eyeball. These have been written of as "indirect gunshot injuries of the eye," in which the passage of a bullet through some part of the orbit is followed immediately by free bleeding into the vitreous and, as this clears up, by various and

mixed appearances of choroidal rupture, choroido-retinal exudation, and changes at the disc without shrinking of the eyeball or any sign that the globe was ruptured.

The question as to how these injuries are produced was answered by the description of a case in which the eye was excised by Cohn and examined by Waldeyer in 1871.

Cohn concluded that a contusion which directly affects only the outer surface of the sclerotic may set up severe and extensive plastic inflammation in the subjacent retina and vitreous.

He mentioned other cases by Cohn as well as one shown before the Society by Mr. F. Menteith Ogilvie last year.

Case 1.—Wound of L. orbit by a Mauser bullet at fifty yards. Entrance at lower and outer angle of orbit and exit point over articulation of jaw. Six months later extensive damage to choroid and retina from rupture and inflammation, and total blindness of same eye from atrophy of optic nerve.

Case 2.—Extensive shell wound of face followed by erysipelas and secondary hemorrhage. Three months later linear rupture of choroid. Extensive hemorrhage into vitreous, slight optic neuritis. It is not certain that projectile entered orbit and the case resembled a choroidal rupture by contre-coup from a direct blow on the eye.

Case 3.—Bullet wound from small revolver fired suicidally into R. temple and passing behind eyeball. Five months later rupture and fibrous exudation upon choroid and retina involving yellow spot and partial atrophy of optic nerve. This was followed by permanent ptosis and loss of upward movement of the eyeball.

Case 4.—Bullet fired suicidally into R. temple passing behind both eyes. R. eye, immediate and permanent blindness, vitreous full of blood. Bullet probably severed optic nerve. L. eye, considerable and immediate damage to sight without ophthalmoscopic change, followed by pallor of optic disc with improvement of vision to $\frac{6}{15}$. Here there was probably injury to optic nerve high up by fracture of the optic canal.

Case 5.—Bullet fired suicidally from revolver into R. temple causing total and permanent blindness of both eyes. Two months later much opacity in each vitreous with no evidence of detachment of retina.

Case 6.—Wound of left orbit by bullet. Sight of L. eye found defective soon after. In three months L. eye nearly blind. Large areas of choroido-retinitis, deeply pigmented with atrophy of optic nerve.

The feature of interest in these cases is the extensive damage of the choroid and retina without wound of the eyeball.

These indirect injuries are to be explained by the force of the projectile being changed into radiating vibrations of the tissue particles acting, as Prof. Stevenson of Netley says, "as secondary missiles." These passing through the dense sclerotic without damaging it, seriously injure the less resisting choroid and retina; dragging on the muscular insertions by the bullet may also contribute toward the injury. Mr. Nettleship mentioned some interesting experiments by Coler and Stevenson which had also been verified by himself, in which they had fired bullets at cylindrical metal vessels, some containing air only and others water, in both cases with no lid on the top. He showed photographs and the actual cylinders from his own experiments. In the former cases the bullet went through without producing much effect on the surrounding parts, but in the latter, which contained water, the vibrations set up in the fluid had produced very marked changes around the holes the bullets made.

In this way the spinal cord may be injured by vibrations passing through the bone without damaging it.

He then compared the results of bullet wounds with those of optico-ciliary neurotomy and also with the experimental evidence produced by Poncet, who in healthy rabbits cut the optic nerves and the posterior ciliary nerves. This latter caused from the eighth day onward degeneration of the nerve elements of the retina with increase of its fibrous structures, marked papillitis, and some inflammation on the outer surface of the vitreous. Later on the choroid near the disc became atrophied and finally the degenerated retina became pigmented. In all these cases there is a great tendency for the retina and choroid to become united by inflammations, and this will explain the slight tendency there is to detachment. In most of these cases other cranial nerves are of course involved and the commonest paralytic sign was ptosis.

Other cases were mentioned by Messrs. Donald Gunn, Hartridge, Gruber, Treacher Collins (who had had two), and the President.

A case of **cysticercus in the eye** which had come under the care of Dr. DAVID WARD, of Cape Town, was in his absence related by Mr. NETTLESHIP.

The patient was a French cook who was first seen by Dr. Wood on April 6, 1900, after spending some time on the Modder River. On dilating the pupil he saw some choroidal changes, and on the outer side a large round grayish body.

On May 2d he saw the living cysticercus moving its suckers, and the hooklets were also visible; the vision was failing.

In June the vision was getting worse, and by July 15th it amounted to P. L. only, and this was due to the fact that the retina was becoming detached. The cyst was then loose in the eyeball, but no details of the head were visible.

On arrival in England in August, Mr. Nettleship saw the patient. There was then a large cyst seen at the inner and upper part of the vitreous covered with fine white calcareous bodies. A dense white patch was seen in one part, which frequently gave a heaving movement.

On September 7th movements were still visible. The eye being blind, the question of operation was not entertained. The patient had now gone back to South Africa, and this is the last note up till the present time. The man had first noticed some affection of the eye in November last.

Mr. LANG expressed surprise that in the early stage, when it was (he thought) subretinal, no operation was undertaken. Mr. Nettleship, however, stated that he gathered from Dr. Wood's notes that it was in the vitreous where he first saw it.

Dr. LITTLE (Manchester) said he had seen 5–6 cases of cysticercus in the vitreous, and in appearance they resembled that described in Dr. Wood's case. If left to themselves, the eyes become blinded by slow but progressive choroido-retinitis.

In two he tried to extract the cyst, but this was not successful, and both eyes became worse and had to be excised a few months later. Some had been successfully removed, but his own experience led him to look upon the prognosis as extremely bad, no matter whether an operation was attempted or not.

The following card specimens were shown:

Mr. H. WORK DODD, **Voluntary bilateral nystagmus.**

Mr. E. K. CAMPBELL, **Double cataract after typhoid fever.**

Mr. GRIMSDALE, **Double congenital lachrymal fistula.**

Mr. W. LANG, **Rupture of the nerve fibres at the optic papilla.**

Dr. ELDRIDGE GREEN, **A case of trichromic color-blindness.**

Mr. JOHN GRIFFITH, **Symmetrical exostoses in the neighborhood of the lachrymal sac.**

Mr. E. TREACHER COLLINS and Dr. J. S. HINNELL, **Diminished tension and the appearance of optic neuritis persisting for nine months after a wound of the orbit from a shot from an air-gun.**

Mr. J. HERBERT FISHER, **Tubercle of conjunctiva.**

MEETING OF THURSDAY, NOVEMBER 8, 1900, G. ANDERSON CRITCHETT IN THE CHAIR.

Dr. W. ERNEST THOMSON read a paper **on the determination of the influence of the eye on the growth of the orbit by experimental enucleation of one eye in young animals.** He stated that this research was undertaken in order to determine whether removal of an eye in early life results in faulty development of the orbit. Such faulty development has been both asserted and denied, although experimental evidence has, seemingly, been hitherto wanting. One eye in a series of rabbits was enucleated under ether about the 20th day of life. The animals were kept for periods varying from 6 to 8 months and were then killed. The orbits were carefully measured and the results found to be a very marked difference between the normal and the anophthalmic side. The deficiency is very uniformly distributed over the length, height, and depth of the orbit, and amounts to something like 10 % in the macerated skull and from 10–15 % in the wet condition.

It thus appears that the greater fault is in the development of the bones and the lesser in that of the soft tissues.

Lantern slides were shown which brought out the various points, and the skulls themselves were exhibited.

The PRESIDENT thought the paper one of great interest and practical importance. He strongly advocated the insertion of artificial eyes early.

Dr. GRUBER thought that the attachment of the muscles to the eyeball and the increased blood supply consequent on the normal functions of the orbit being exercised, had far more to do with the development of the orbit than had the mere presence of an artificial eye in the conjunctival sac.

Dr. THOMSON briefly replied.

Mr. NORMAN G. BENNETT read a paper on the **ætiology of lamellar cataract.** He introduced the subject by referring to the measurements of lenses taken by Bernand Duband and Treacher Collins either ophthalmoscopically during life or after removal of the lens, from which it appeared that the diameter of the opaque zone was never larger than that of the lens at birth, and that therefore either the lesion was occasioned before birth or the part affected was not the most peripheral at the time of its occurrence. He then described the structure of the hypoplastic

teeth usually associated with the lamellar cataract, and detailed the dates of calcification of the two dentitions according to the investigations of Röse, showing what parts of the teeth might be affected by any cause acting during the first two years of life.

Mr. Bennett described minutely the teeth as they existed in twenty-two cases of lamellar cataract which he had collected. They naturally fell into two classes on the basis of the extent of enamel affected, but in both classes it appeared evident, if the facts were taken in conjunction with the dates of calcification as investigated by Röse, that the affection had its commencement almost immediately after birth. Its period varied considerably in one class of case, and appeared to be about two years in the other larger class. The exact causation had long been a matter for discussion. After referring to the various causes that had been suggested from time to time, Mr. Bennett described a large number of cases of hypoplastic teeth, showing that among those not associated with lamellar cataract the same uniformity of type was not met with, the determining cause of the defect obviously having occurred at a much later date in a large number of cases. From a number of cases with definite histories he showed that this latter type of tooth was frequently, though not always, the result of an exanthematous fever, whereas those more frequent cases of teeth affected soon after birth were often associated with a history of convulsions and general disturbance of health of an indefinite kind. Sometimes the teeth would have two or more horizontal depressions corresponding with a series of definite attacks of illness.

The inference was, then, that lamellar cataract was a disease of early infantile life, occasioned by some general derangement of health, the most probable being errors of diet and nutrition. In emphasizing this conclusion, Mr. Bennett referred to the developmental similarity between lens and enamel, and cited an opinion of Mr. Collins to show that the inferences he drew were not necessarily inconsistent with those afforded by the measurement of lenses referred to above, but that lamellar cataract might be the result of contraction of the nucleus of the lens some time after birth.

The PRESIDENT asked Mr. Bennett whether he had noticed the disease to occur in many members of the same family, and he recounted a case which had occurred in his own practice in which there was a very strong family history. The father suffered from

lamellar cataract; two of his children were affected with the disease; he has—or had—seven cousins affected as well as one niece and two sisters.

Mr. TREACHER COLLINS had investigated ten cases of congenital cataract, but in none of them was the enamel defective.

Mr. JOHN GRIFFITH expressed his strong opinion that the disease was a congenital and not an infantile one.

Mr. BENNETT briefly replied, and in answer to the President's question he stated that he had not carefully investigated the family history.

The following card specimens were shown:

Mr. SIMEON SNELL, **epithelioma of the cornea.** The patient was a soldier, aged forty-five, with a history of injury seven years ago. In May, 1898, it was removed, but it recurred. Mr. Snell first saw the patient in August, 1900, when the growth filled the interpalpebral space. The eyeball was enucleated and the growth shown to be an epithelioma.

Mr. JOHN GRIFFITH, **specimen of osteosarcoma of the orbit.**

Mr. TREACHER COLLINS and Mr. VERNON FORD, case of **bullet wound of the orbit** followed by blindness of both eyes. The patient was with Admiral Sir E. A. Seymour's expedition for the relief of Pekin. He was shot through the head with a bullet, and it was found that in one eye the choroid was ruptured while in the other the retina was detached.

Mr. A. W. ORMOND, **chancre of the upper lid at the retro-tarsal fold.**

MEETING OF DECEMBER 13, 1900. (CLINICAL EVENING.) G. ANDERSON CRITCHETT, M.A., F.R.C.S.E., PRESIDENT, IN THE CHAIR.

Mr. J. H. FISHER: A case of **congenitally imperfect separation of the iris from the back of the cornea.** The patient was a woman aged twenty-seven who had been treated recently at the London Hospital for an attack which appeared to be one of acute or subacute glaucoma.

On examination the whole anterior surface of the left iris was pitted. At the outer and lower part there was a wide adhesion of the iris to the back of the cornea, while on the inner side it was adherent to a less extent. Mr. Fisher worked out the refraction under homatropine with the result that the tension rose to + 1. There was pain and the pupil remained dilated although

that of the right eye had regained its normal condition the next day. He considered that this case threw some light on congenital glaucoma, as the position of the iris here clearly was the cause of the increased tension.

Mr. W. T. LISTER: **Large dermoid tumor on the cornea of an ox.** In this specimen there was a large growth on the cornea and sclera from which grew a bunch of long hairs.

Mr. G. BROOKSBANK JAMES: **A rare example of persistent pupillary membrane.** The patient was a child aged eight. She was brought on account of a convergent squint. She is one of a family of four, none of the others having any eye affection. When sixteen months of age there was a slight inflammatory attack which lasted a few days only. In the right eye there is a convergence of 40°. The iris is of a pale grayish-yellow color. The normal pupil is occupied by strands which enclose several openings. In the left pupil there are some small tags of pupillary membrane with good vision in the eye and 5 D of H. In the affected eye the vision is extremely bad and the projection is good.

Mr. JAMES also showed a boy aged eleven who with his H corrected had normal vision. In the fundus there was a large pigmented area below the disc, which had a crescent. The pigment was mostly under the vessels but near the disc they dipped into it. There was also a strand of persistent pupillary membrane. Mr. James referred to some cases shown by Mr. Sydney Stephenson which had somewhat similar changes.

Mr. A. STANFORD MORTON: **Growth on cornea.** This was a boy aged seven who was first seen in August. At the upper corneal margin there was a yellowish spot 4 *mm* in diameter; it was not raised above the corneal margin and it extended downwards to about the margin of the undilated pupil. He tried to shave it off but failed to do so. He then transfixed it and entered a space full of yellowish material, which he scraped out. It was found on examination to consist of connective tissue with some elastic fibres but no fat. On the deep surface of the part removed there was some cellular material in which a few giant cells appeared to be, but there was nothing typical of tubercle. It certainly was not congenital and it continues to spread but very slowly.

Mr. NETTLESHIP referred to a case he had seen with Mr. Bickerton which was somewhat similar and here after a time it ceased to grow. Mr. GOLDSMITH also referred to a somewhat similar case.

Mr. A. H. Thompson: **Superficial choroidal atrophy without subjective symptoms in a member of a family subject to night-blindness.** The patient was a woman who made no complaint of her vision, which was found on testing to be $\frac{6}{9}$ in one eye and $\frac{6}{6}$ in the other. The maculæ were normal and the fields full. In each eye there was a large area of choroidal atrophy; there was, however, no night-blindness or diminished light-sense. This patient's father had difficulty in seeing objects though he could see to read small print, and there are several members of the family who suffer from night-blindness.

The President had found that many of these people received very great assistance from wearing glasses of a golden yellow tint, and he thought that the cutting off of the violet rays by glasses of this color might be the explanation of this, although it did not help every one.

Mr. Eldridge Green thought it would be interesting to see if this patient saw with the macula as quickly as a person with normal sight. He had tried the golden yellow glasses and in a dim light he at first saw better with them, but after wearing them for some time he certainly saw no worse when he removed them.

Mr. Tempest Anderson discussed the employment of yellow glass used in the photographic camera when taking a picture of the sky and clouds.

Dr. W. C Rockliffe: **Conjunctival growth-pinguecula.** This patient aged twelve, was first seen in August. The mother stated that at birth a small red pimple was noticed at the outer side of the left cornea, and it has slowly spread since then. A crescentic pigmented thickening, which was *2 mm* in thickness, surrounded the outer third of the cornea. It was freely movable with the cornea and had no deep attachment, so that a probe could be passed beneath it. It had not enlarged to an appreciable extent during the last three months.

There was a history of tuberculosis, but a piece he had removed for examination had not yet been reported on. The fundus was normal and the vision $\frac{6}{9}$. Dr. Rockliffe stated that he did not think it malignant, and he mentioned a similar case shown to the Society by Dr. W. J. Collins. In the *Ophthalmic Review* for October is an abstract of a paper by Lagrange in which he states his belief that they are usually of a dermoid nature but they contain hairs, whereas in this case no hairs were present. Dr. Rockliffe stated his intention of dissecting it out.

Mr. R. MARCUS GUNN: **Tubercle beneath the ocular conjunctiva.** The patient was a girl aged thirteen, beneath whose conjunctiva of the left eye, near the cornea, was a vascular growth. She has tuberculous glands but there was no family history of tubercle.

Mr. J. H. FISHER: **Sarcoma of the conjunctiva.** The patient was a man aged twenty-eight who had been invalided out of the army on account of the eye. In May of last year he first noticed a small red spot which grew and was removed in February of this year. It was removed again in May and also in August for recurrence. There is now a flat yellowish-brown mass which is smooth on the surface and vascular. About ⅓ of the cornea is covered, but the vision is good. There is no glandular enlargement and no specific history. Mr. Fisher proposed to remove the eye with the growth, as partial operations had been proved useless.

Mr. C. BLAIR: An **unusual case of choroiditis.** The patient was a woman whose sight had been affected for about three months and was now J. 20. There is an area of closely packed choroiditis with almost an entire absence of pigment. The patches are not raised and the field of vision is defective. The vitreous is full of opacities, but there was no specific or tuberculous history.

Mr. JESSOP always looked upon these cases of vitreous opacities as being syphilitic and thought that this case was really of that nature.

Mr. C. O. HAWTHORNE also mentioned a case.

Mr. W. T. HOLMES SPICER: **Nævus of the orbit.** The patient was a married woman who when seen in July, 1898, had some proptosis of the left eye due to a vascular tumor. In August of that year he used electrolysis without any immediate result. In January, 1899, he again electrolyzed it. She became pregnant and during this time it increased greatly in size. A hard mass was then felt, and on cutting into this it was found to be an old blood cyst. Shortly after the cornea ulcerated and the eye was excised.

Mr. SPICER then sent the patient to Dr. Lewis Jones, who considered that owing to the apparent free communication of the growth with the cavernous sinus electrolysis was not safe.

Mr. FROST suggested that pressure might be beneficial.

The PRESIDENT thought that the growth had better be left alone owing to the danger of cutting into so vascular a tumor.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE SECOND QUARTER OF THE YEAR 1900.

By Prof. ST. BERNHEIMER, at Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

with the assistance of

Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections I.–III. Reviewed by Prof. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

217. **Mell, Alexander.** Encyclopædic hand-book of blindness. Vienna and Leipsic, 1900. A. Pichler's widow and son.

218. **Greeff.** Microscopic anatomy of the optic nerve and retina. *Graefe-Saemisch*, 2d edition.

219. **Elschnig.** Pathological anatomy of the optic-nerve entrance. Microphotographs by O. Zoth. 12 plates with text. Charts for instruction edited by Magnus. Part xix. Breslau, 1900. Kern.

220. **Magnus.** The anatomy of the eye in its historical development. 13 colored plates with text. *Ibid.*, part xx.

221. **Schmitz.** Report of the eye hospital at Samarkand, 1898–1899. *Wjest. Ophth.*, 1900, No. 2.

222. **Leprince.** Ophthalmological year book, 1898–1899. Paris, A. Maloine, 1900.

223. **Seggel.** The eye and the ability to shoot. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 322.

The encyclopædic hand-book of blindness by MELL (217) treats not only of general questions, but also of the development of the education of the blind, institutions for the blind, methods of instruction and training, and the like. It then treats of the causes of blindness and of the lives and work of eminent teachers of the blind.

The 22d section of *Graefe-Saemisch* contains the conclusion of the article on the anatomy of the retina by GREEFF (218), which is the most comprehensive article yet written on the subject.

ELSCHNIG (219) presents on twelve plates the pathological forms of the optic-nerve entrance. These are representations of sections of the nerve in atrophy from tabes, disseminate sclerosis, optic neuritis, brain tumor, internal hydrocephalus, thrombosis of the central vein, absolute glaucoma, secondary glaucoma, and detachment of the retina.

MAGNUS (220) presents on thirteen chronologically arranged plates the historical development of the anatomy of the eye from the time of Democritus of Abdera (470 B.C.) to the present.

SCHMITZ (221) treated 4355 out-patients, 24% of whom had trachoma, and made 574 operations, of which 71 were for cataract.

LEPRINCE'S (222) year book presents a comprehensive review of the entire ophthalmological literature of the years 1898 and 1899, taking the *Jahresbericht* of Nagel and Michel as a model.

According to SEGGEL (223) it is desirable that not only myopia of high degree but also hyperopia and astigmatism of high degree should be regarded as rendering one unfit for service in the army, since in all these cases the acuteness of vision is rarely above one half.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

224. **Nicati.** Ocular hydrostatics. *Arch. d'opht.*, xx., 2, p. 65.

225. **Nuel** and **Benoit.** The exit channels for the intraocular liquids from the anterior chamber and the fundus of the eye (optic nerve, etc.). *Arch. d'opht.*, xx., 4, p. 161.

226. **Helleberg.** On the bactericidal action of the tears. *Hygiea*, May, 1900.

227. **Silex.** On the so-called paradoxical pupillary reaction. *Zeitschr. f. Augenheilk.*, iii., p. 408.

228. **Wiegels.** Congenital microphthalmus with fat in the vitreous. *Graefe's Archiv*, l., p. 368.

229. **Van Alphén.** Photometric investigations on the illumination for fine work. *Inaug. Dissert.*, Amsterdam, 1900.

230. **Thorner, Walter.** On the objective determination of refraction by means of an ophthalmoscope free from reflexes. *Zeitschr. f. Psych. u. Physiol. d. Sinnesorgane*, xxiii., p. 187.

231. **Trantas.** A means of exploring with the ophthalmoscope—by trans-illumination — the anterior portion of the fundus, including the ciliary circle. *Arch. d'opht.*, xx., 6, p. 314.

232. **Druault.** The astigmatism of rays entering the eye obliquely. The application of skiascopy. *Ibid.*, 1, p. 21.

233. **Meisling.** The examination of the field of vision by means of white test objects seen under a small visual angle. *Diss.*, Copenhagen, 1900.

234. **Pesella.** On the therapeutic value of combined intravenous and subconjunctival injections of bichloride in syphilis of the eye. *XV. Congress dell' Assoc. oftalm. ital.*, Turin, 1900.

235. **Puccioni.** Subconjunctival and intravenous injections of bichloride in infections of the eye. *Bull. della R. Accad. med. di Roma.*, xxvi., 3-4.

236. **Trombetta.** Parenchymatous injections of iodine in ocular affections of scrofulous origin. *XV. Congress dell' Assoc. oftal. ital.*, Turin, 1900.

237. **Valvis.** A case of ether anæsthesia. *Rec. d'opht.*, 1900, No. 2, p. 72.

238. **De Lapersonne.** Exenteration by means of heat in panophthalmitis. *Arch. d'opht.*, xx., 6, p. 289.

239. **Schmidt-Rimpler.** On enucleation of the eye and a measure for taking its place, with special reference to sympathetic ophthalmia. *Deutsche med. Wochenschr.*, 1900, Nos. 27 and 28.

The interesting and comprehensive paper by NICATI (224) treats of the doctrine of intraocular pressure in its technological, physiological, and pathological relations. The investigations were made with an instrument called a sclerometer. The intraocular pressure is proportional to the blood pressure and is everywhere the same whether the cornea or the sclera is measured. The pressure does not increase in old age but rather, like the blood pressure, decreases somewhat. It stands in a certain relation to the body weight or rather to the ratio between volume of body and body surface. Thus, in volume, the rabbit is to man as 1:20, in body surface as 1:10, and the eye of man is twice as hard as that of the rabbit.

Besides the blood pressure the contractility of the eye affects its tension. The active power of contractility may be shown on a freshly enucleated animal eye which after faradization will become hard through a contraction of the musculature of the choroid. The normal activity of this choroidal muscle, as the author calls it, bringing about reflexly, through excitation of Müller's nerve plexus of the choroid, variations in the blood

pressure, is of great importance as respects the uniform blood circulation and nutrition of the eye. There are thus intraocular ganglia which provide for the innervation of the choroid independently of the sympathetic and other nerves, and affect intraocular tension only through their action on the blood pressure.

Since the determination of the ocular pressure furnishes a measure of the pressure in the capillary vessels, this is of prognostic value in other branches of medicine and serviceable in determining the existence of death. v. MITTELSTÄDT.

NUEL and BENOIT (225) made injections of India ink into the vitreous of human eyes enucleated for recurrent malignant orbital tumors and for glaucoma, and also into the vitreous of the eyes of animals, for the purpose of studying the exchange of liquids.

The very readable article is well illustrated, and the chief points made are as follows:

The greater quantity of aqueous humor leaves the eye through the anterior chamber, but in rabbits a considerable portion escapes along the optic nerves. The exit from the anterior chamber takes place particularly through the iris angle into the venous system of Schlemm's canal, the veins of the ciliary body, and those of the ciliary processes. The entire anterior surface of the iris with its crypts helps to take up the aqueous, which then is carried off by the capillaries and veins of the iris.

In the dog the absorption by the iris is less than in man, and in the cat it is less than in the dog. In both animals the absorption through the vessels of the ciliary body is considerable. In the rabbit, on the contrary, this channel is inconsiderable, and the iris scarcely absorbs any of the aqueous, while filtration through the perforating veins is equal to that in other animals. A considerable stream passes, however, along the intervaginal space of the optic nerve. In other animals and in man this stream if present is very inconsiderable.

In the chicken Schlemm's canal and the anterior surface of the iris form the chief channels of absorption.

In advanced glaucoma all the channels of exit from the anterior chamber are more or less blocked. In secondary glaucoma the iris and ciliary vessels may have some slight power of absorption. A vicarious excretion through the optic nerve does not take place in glaucoma. Filtration takes place through 3–4 months' old sclerotomy cicatrices, especially when the iris is included. v. MITTELSTÄDT.

HELLEBERG (226) has subjected the question of the bactericidal action of the tears to a new test. From the investigations of earlier authors it appeared that many sorts of micro-organisms quickly died when they were inoculated into the tears. It remained undecided whether this was because of the bactericidal action of the tears or because they did not furnish a satisfactory nutrient material.

A series of 22 experiments showed a diminution or complete destruction of the germs in 16 cases, and a slight increase in 4 cases, but the increase was much less than when the staphylococcus was inoculated into sterile bouillon. It is shown, therefore, that the tears possess an actual bactericidal action.

Continuing, the author inquires as to what constituent of the tears produces this effect. A series of 15 experiments showed that this effect was always destroyed by four or five minutes' boiling. Since boiling would not affect the saline constituents of the tears, the bactericidal principle must be either a volatile substance or an albuminous substance which is precipitated by the boiling. DALÉN.

SILEX (227) reports a case in which the illuminated pupil dilated to 6 *mm* or more.

WIEGELS (228) examined an eye with congenital microphthalmus in which the entire vitreous was replaced by typical fatty tissue, perforated by a well-developed persistent hyaloid artery and surrounded by a connective-tissue sheath.

v. ALPHÉN (229) has made investigations with Weber's photometer in regard to the illumination in various workshops in which an illumination of 15 metre candles is required by the laws of Holland. One shoemaker was found working in an illumination less than 15 metre candles, while most workers had 100 or more. JITTA.

THORNER (230) has so modified his ophthalmoscope without reflexes that it is possible to determine refraction with it.

While the anterior limit of the visible fundus lies 8 *mm* from the sclero-corneal margin, or even 2 *mm* farther forward when the sclera is trans-illuminated by concentrated light passed through the pupil, TRANTAS (231) shows that the visible field may still be extended forward if one presses in the ciliary region with the finger or a sound. This is especially easy in hyperopic eyes when the pupil is dilated. Even by oblique illumination one can see

the ciliary processes. The author points out the value of such examination in cases of injury, inflammation, tumor, and congenital changes. v. MITTELSTÄDT.

By means of skiascopy DRUAULT (232) determined the astigmatism of the oblique rays and found it less than that obtained by calculation regarding the surfaces of cornea and lens as regularly spherical. The astigmatism is less to the temporal side than to the nasal on account of the angle α. As is shown by the round form of the peripheric scleral image when oblique rays fall into exophthalmic eyes, the retina lies between the two focal distances and therefore is favorably located for the perception of objects nearer than the point of fixation. On account of this astigmatism skiascopy must be practised in the region between the disc and the macula, the eye being turned a little more temporally than when the disc is examined. v. MITTELSTÄDT.

In an extensive paper MEISLING (233) reports on the results he obtained by determining the field of vision according to Bjerrum's method (small white test objects). He has paid particular attention to the peculiar defect in the field in glaucoma, first discovered by Bjerrum (a curved defect, including Mariotte's blind spot and extending above or below the point of fixation), which can only be made out by some such refined method. He concludes that :

1. Glaucomatous defects in the majority of cases are of the peculiar type described by Bjerrum.

2. Affections of the retinal vessels may in certain cases cause defects in the field which correspond to those of glaucoma.

3. When the examination is made with very small white test objects, much larger functional defects in the field can be made out than by the ordinary perimetric methods. DALÉN.

PESELLA (234) reports on a great number of intravenous injections of bichloride, which always led to good results, less mercury being introduced into the system than by the other methods of administration. For details the original must be consulted.
KRAHNSTÖVER.

In opposition to the view, held chiefly in the Palermo clinic, that deep infections of the cornea and uveal tract after injuries and operations may be cured by subconjunctival and intravenous injections of bichloride, PUCCIONI (235) believes that this treatment is without value, and experiments on dogs and rabbits were never

successful. The value of such injections in cases of syphilitic disease, however, is unquestioned. KRAHNSTÖVER.

DE LAPERSONNE (238) recommends in place of enucleation or exenteration in panophthalmitis the destruction of the contents of the eye by means of the thermo-cautery. The cornea is split horizontally with a Graefe knife, and with scissors a cut is made up and down at the middle of the wound so that a crucial incision is obtained. After the pus and the lens are allowed to escape, a thermo-cautery blade is carried over the entire inner surface of the sclera. Following the operation there is considerable secretion, necessitating a change of dressing twice daily. In from 10–20 days cicatrization is complete. A small stump with a leucomatous cornea remains. The author regards this method as preferable to the usual operations, and cites a number of case histories. V. MITTELSTÄDT.

According to SCHMIDT-RIMPLER (239), the safest operation for the prevention of sympathetic ophthalmia is enucleation. Exenteration is somewhat less of a protection, and optico-ciliary neurectomy still less because of the possibility of the anterior ciliary nerves remaining intact or new nerves growing onto the eye again. Exenteration is always indicated when there is a purulent process in the eye, since experience has shown that after enucleation the pus may readily escape into the orbit, and extending to the meninges, lead to a fatal result.

III.—INSTRUMENTS AND REMEDIES.

240. **Scrini.** Oily collyria again. *Arch. d'opht.*, xx., 2, p. 103.

241. **Rabinovitsch.** Psychical disturbances from the use of eserine. *Rec. d'opht.*, 1900, 4, p. 217.

242. **Sidler-Huguenin.** On the effect of sterilizing procedures upon cocaine solutions and on the best methods of keeping cocaine and atropine solutions sterile. *Corr.-Bl. f. Schweizer Aerzte*, 1900, Nos. 6–7.

243. **Guaita** and **Bardelli.** Applications of cocaine for determining the degree of heterophoria. *XV. Congr. dell'Assoc. oftal. ital.*, Turin, 1900.

244. **Darier.** The method of employing dionin. *Bull. de la Soc. d'opht. de Paris*, 1900, Apr. 3.

245. **Graefe, A.** Dionin in ophthalmology. *Deutsche med. Wochenschr.*, 1900, No. 12.

246. **McHardie.** Some cases showing the use of "gas and oxygen" as an anæsthetic in certain ophthalmic operations. *The Lancet*, 1900, p. 1435.

247. **Nicolai.** A simple apparatus for measuring the amplitude of accommodation. *Ann. d'ocul.*, cxxviii., p. 351.

248. **Terrien.** A note on a new model of the ophthalmoscope. *Arch. d'opht.*, xx., p. 29.

249. **Eversbusch.** An apparatus for the practical examination of the color sense in railway and marine employés. *Graefe's Archiv*, l., p. 150.

250. **Green, E. J. W.** On the inefficiency of the board of trade tests for the detection of color-blindness. *The Lancet*, 1900, p. 1511.

251. **Eversbusch.** A simple method of obtaining projection images for the clinical teaching of ophthalmology. *Graefe's Archiv*, l., p. 161.

SCRINI (240) replies to the remarks of Valude, who regards oily solutions of the alkaloids as superfluous and the aqueous solutions as more active. Scrini repeats the reasons for his preference and reports a case of glaucoma in which an oily solution of eserine led to a favorable result.

RABINOVITSCH (241) observed, in a patient of eighty years, suffering from arterio-sclerosis, who had instilled five per cent. eserine into his eye twice daily for three years on account of glaucoma, that each instillation was followed for two or three hours by slight increase in temperature, frequent and intermittent pulse, tonic spasms of the extremities, psychic disturbances with illusions of vision and touch, and delirium. He recommends that great caution be employed in using eserine in the conjunctiva of the aged. BERGER.

According to SIDLER-HUGUENIN (242), solutions of atropine or cocaine which have been kept some time in the ordinary drop bottles become impure. These solutions also lose their efficacy in part. Furthermore, long-continued heating or boiling also causes chemical changes in consequence of which the solutions are less active.

DARIER (244) modifies the employment of dionin, using it only in five per cent. solution and instilling it a drop at a time, which causes chemosis and analgesia but no anæsthesia of the cornea. BERGER.

GRAEFE (245) used dionin in ten to twenty per cent. solution or in powder form in two hundred cases. The results were favorable in old affections of the cornea, trachoma excepted, in dry and chronic catarrhs of the conjunctiva, in iritis and iridocyclitis when used with atropine, in cases of opacity of the vitreous, and apparently also in chorio-retinitis. As an anæsthetic it is to be rejected, and also in all operations in which the ball is to be opened, on account of the stripes that follow its use.

McHARDIE (246) commends a mixture of laughing-gas and oxygen as a narcotic in eye operations on account of the lack of danger, the quickness with which anæsthesia is obtained, and the absence of after-effects. ABELSDORFF.

The advantages which TERRIEN (248) claims for his refraction ophthalmoscope are handiness, simplicity, ease in taking apart, and the low driving wheel which sets in motion the disc containing the lenses through the medium of a small toothed wheel.
v. MITTELSTÄDT.

GREEN (250) speaks of the unreliability of the Holmgren worsted tests for the color sense, since color-blind persons may be overlooked and those with normal color perception held to be color-blind. He recommends for accurate diagnosis the classification and lantern tests described in his book on color-blindness.
ABELSDORFF.

Sections IV.–VII. Reviewed by PROF. BERNHEIMER, Innsbruck.

IV.—ANATOMY.

252. **Widmark.** On the dilatator pupillæ muscle. *Hygiea*, May, 1900.
253. **Heerfordt.** Studies on the dilatator pupillæ muscle, etc. *Diss.*, Copenhagen, 1900.
254. **Tornatola.** On the formation of vessels in the vitreous of the embryo. *XV. Congr. dell' Assoc. oftalm. ital.*, Turin, 1900.
255. **Tornatola.** On the pericrystalline mesoderm in vertebrate embryos. *Ibid.*
256. **Rochon-Duvigneaud.** Researches on the anatomy and pathology of the lachrymal passages in the adult and in the new-born. *Arch. d'opht.*, xx., 5, p. 241.
257. **Stanculanu.** Researches on the development of the lachrymal passages in man and in the animals. *Ibid.*, No. 3, p. 141.

WIDMARK (252) discusses the various views held in respect to the existence or non-existence of a dilatator pupillæ muscle (Henle, Grünhagen, Schwalbe, Retzius, Anderson and Langley, Grunert, Grynfeldt, and many others), and then gives the results of his study of five eyes enucleated for sarcoma. The sections were bleached by the method of Alfieri, Pisa, and stained with Heinenhain's iron hematoxylin, with acid-fuchsin + orange, and by van Gieson's method. The author found that the so-called membrane of Bruch is composed of very long closely lying cells having individual nuclei. These cells take the van Gieson stain in the

same manner as the cells of the sphincter muscle and are to be considered unstriped muscle cells. DALÉN.

According to HEERFORDT (253) the dilatator muscle of the pupil is formed from the anterior layer of pigment epithelium. Each cell consists of a contractile fibre formed like a non-nucleated unstriped muscle cell. The contractile portion of the cells forms a lamella, the so-called membrane of Bruch. When the pupil is contracted with eserine the cells are separated and readily distinguished. The paper is illustrated with many colored plates. DALÉN.

ROCHON-DUVIGNEAUD (256) explains, by means of a great number of drawings of longitudinal sections of decalcified skulls of the new-born and adults, the anatomical relations of the tear passages, which are not sufficiently treated of in the handbooks. In adults there are extraordinary variations in the width of the entire canal and also in single portions, and differences in length and direction. At the upper end, where the canaliculi enter the sac, there is almost always a fold, and at the lower end of the canal the margins of the fœtal terminal vesicle are always present though differing in degree. The epithelium of the canalicula is of the pavement variety, but from their point of entrance down through the whole length of the duct there is cylindrical epithelium. The mucosa is free from glands. The sub-mucosa is denser than that of the conjunctiva, but equally rich in lymph vessels. There are many lymph follicles. In the new-born, closure of the lower end of the canal may cause the well-known mild suppuration in the tear sac that is so readily cured, but later in life these folds almost wholly disappear and any constriction of the canal that takes place is of an inflammatory nature. There are two main forms. There is a stoppage either where the sac passes over into the canal, leading to a distension and inflammation of the former, or the narrowing begins as an ascending stenosis at the lower end of the canal and is probably the result of nasal disease. Here even if the canal is largely obliterated the suppuration and distension of the sac are almost wholly wanting, since the sclerosing inflammation here as elsewhere in the canal prevents distension.

As regards therapeutics, the author believes that the canal and sac should be left intact as far as possible and the passing of probes should be from the nose upward. For this purpose the anterior third of the inferior turbinated body should be resected

and the canal indicated by passing a fine probe from above. The fold of mucosa then lying on the probe is to be burnt away so that the canal may lie exposed for treatment.

v. MITTELSTÄDT.

V.—PHYSIOLOGY.

258. **Neuschüler.** On a reflex persisting after the complete section of the trigeminus. *Ann. di Ottalm.*, xxviii.

259. **Sodato.** The changes in the retina under the influence of light, colors, and other physical and chemical agents with special regard to the chemical reaction. A contribution to the physiology of the retina. *Arch. di Ottalm.*, vii., 9–12.

260. **Magnani.** The influence of the width of the pupil upon the perception of colors. *Ibid.*

261. **Birch-Hirschfeld.** A contribution to the knowledge of the retinal ganglion cells under physiological and pathological conditions. *Graefe's Archiv*, l., 1, p. 166.

262. **Angelucci.** Researches on the mechanism of the pupillary reaction as studied in man after excision of the superior cervical ganglion. *Arch. di Ottalm.*, vii., 3–8.

NEUSCHÜLER (258) found, after complete intracranial section of the trigeminus in rabbits, that touching the lids frequently brought about a slight reflex. Of six cases in which later all the fibres were found to have been cut, there was in two a reflex excitability of the inner third of the upper lid on the operated side when touched lightly. Frequently this reflex was accompanied by a diminution of sensibility of the corresponding area on the non-operated side. KRAHNSTÖVER.

After many experiments with chemical and physical agencies SODATO (259) arrives at the conclusion that there is no connection between retinal reactions and the visual purple, but with a condition of rest in rod and cones there is alkaline reaction in the retina, and with a condition of contraction an acid reaction.

KRAHNSTÖVER.

BIRCH-HIRSCHFELD (261) finds that the ganglion cells of the dark eye are richer in Nissl granules than in the light eye. After a short exposure to the electric-arc light, the chromatin in the cells was considerably diminished, while a longer exposure led to the disappearance of the Nissl granules, shrinking of the nucleus, and the appearance of vacuoles.

The author studied the changes in the retinal ganglion cells due to poisoning of rabbits with quinine, extract of male-fern,

and bisulphide of carbon. He constantly found changes in the chromatophilic elements, formation of vacuoles, swelling, shrinking of the nucleus, and finally destruction of the cell.

After making a series of careful experiments ANGELUCCI (262) concludes that there is no dilatator pupillæ, but that the musculature of the iris has a tone which is regulated by the sympathetic in so far as this acting on the muscle fibres nullifies the influence of the nerves of contraction. For details see original.

KRAHNSTÖVER.

VI.—REFRACTION AND ACCOMMODATION.

263. **Trousseau.** Insomnia due to errors of refraction. *Arch. d'opht.*, xx., p. 312.

264. **Faehndrich.** Clinical studies in astigmatism. *Dissert.*, Berne, 1900.

265. **Ostwalt.** Further experimental investigations on periscopic glasses, with a note of correction in regard to his paper in volume xxiv. of these ARCHIVES. *Graefe's Archiv*, l., 1, p. 44.

TROUSSEAU'S (263) first patient was a mentally-fatigued scholar in the war school with insomnia and headache unrelieved by general treatment. The eyes were examined because meningitis was suspected and H. 2.5 was found. Wearing the correcting glasses alone without other treatment cured the headaches and insomnia. Since this observation was made the author has seen several similar cases. Errors of refraction must be sought for when insomnia occurs in nervous, mentally-overworked persons, or after the diseases of childhood, and does not yield to ordinary methods of treatment.

V. MITTELSTÄDT.

FAEHNDRICH (264) has studied the influence of age and sex on abnormal regular corneal astigmatism and found many differences as regards age, sex, corrigibility, etc.

OSTWALT (265) has made further investigations on periscopic glasses, and among other things he has determined that it is advantageous to replace the ordinary biconcave lenses by meniscus or plano-concave lenses.

In convex lenses the meniscus form is of advantage in the weaker numbers only.

VII.—MUSCLES AND NERVES.

266. **Babinski.** On paralysis of associated movements downward. *Soc. de Neurologie*, Paris, June 7, 1900.

267. **Rouvier.** On the posterior insertion of the muscles of the eye. *Montpellier méd.*, Feb., 1900.

268. **Stirling, J. W.** Recurrent paralysis of the oculomotor nerve. *Ophth. Review*, April, 1900.

269. **Duane.** After-treatment of tenotomy. *Med. News*, April 28, 1900.

BABINSKI (266) presented a patient in whom suddenly, following an apoplectic attack, slight disturbances of speech and mind came on with simultaneous paralysis of movement of the eyes downward. Ballet, in the discussion, remarked that only the voluntary and not the reflex movement of the eyes was affected, and the lesion doubtless was supranuclear. BERGER.

STIRLING'S (268) patient was a girl aged fourteen years, who was first seen on May 12, 1899, with the following history: Four days previously she had a severe bilious headache with vomiting, and this was rapidly followed by diplopia and ptosis on the right side. The headache was on the right side and lasted for three days.

She had had a somewhat similar attack three months ago, the symptoms disappearing in a week, as well as one two years ago with diplopia and this followed diphtheria. All her life she had been subject to sick headaches, and her left eye has been defective in accommodation for several years. The child has had no serious illnesses, but her mother is a lunatic.

The present state is as follows:

All the muscles supplied by the third nerve are paralyzed except the sphincter iridis. The left vision is $\frac{1}{5}$. Pupil sluggish and widely dilated. With sph. + 5 J. 1. Peripheral contraction of the field. R V $\frac{1}{5}$. The eye is healthy in every respect.

June 21st, slight paresis of L int. rectus. No ptosis. Pupil reacts badly to light and not at all on accommodation, and this condition of pupil was present three weeks later.

On August 21st another slight attack of pain with diplopia developed, but there was no ptosis.

These cases are rare, only about sixty having been described.

As most of them are due to some organic lesion of the nerve trunk, the author thinks that this is likely to be the case here, but this has not been verified. MARSHALL.

The after-treatment of tenotomies is of more consequence in the opinion of DUANE (269) than the special method of operating. He relies much on the efforts of the eyes to help in bringing themselves into proper relation. So he does not bandage the eyes after operation. When the under or over correction is small,

he uses prisms which shall force the opposing muscle into action and draw strongly upon the divided tendon. Teaching the eyes to recognize diplopia is a very important element in treatment, the desire to overcome this being a great incentive to an effort to correct it. BURNETT.

Sections VIII.–XII. Reviewed by DR. R. SCHWEIGGER, Berlin.

VIII.—LIDS.

270. **Didikas.** A new trichiasis forceps. *Arch. d'opht.*, xx., 6, p. 326.

271. **Steffan.** A case of gangrene of the lid in which diphtheria bacilli were found. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 339.

272. **Kuhnt.** Restoration of an upper lid that had been bitten off, by transplanting the lower lid combined with transplantation of unpedunculated skin flaps. *Zeitschr. f. Augenheilk.*, iii., 4, p. 322.

273. **Abadie, Jean.** Intermittent hysterical ptosis. *Revue de méd.*, Jan. 10, 1900.

274. **Koster.** The muscular relations of the upper lid in congenital ptosis. *Zeitschr. f. Augenheilk.*, iii., 4, p. 304.

275. **Friedenwald.** A case of plexiform neuroma of the eyelid (Ranken neuroma). *Johns Hopkins Hospital Reports*, ix.

DIDIKAS'S (270) forceps, intended to take the place of Snellen's, consist of a metallic Jaeger plate and two branches corresponding to the lateral margins of the plate and uniting at its centre. The branches may be turned on their axes and altered in their distance apart. V. MITTELSTÄDT.

In STEFFAN'S (271) case there was gangrenous destruction of the inner angle of the lids, together with the caruncle, lachrymal sac, and bulbar conjunctiva up to the limbus. Within two weeks a circumscribed defect had formed 18 x 14 *mm* in extent and extending down to the periosteum. A bacteriological examination revealed the exclusive presence of virulent diphtheria bacilli, and recovery followed two injections of serum, there being rapid cicatrization with moderate distortion of the lids and symblepharon.

In a patient whose upper lid had been bitten off fifteen years before, KUHNT (272) sutured the remainder to the lower lid after removing the seat of the lashes but leaving the puncta free. The great tension that resulted was relieved by the implantation of flaps from the arm. Three months later Kuhnt made a new

palpebral fissure below the tarsus of the lower lid. This aperture could be opened as far as 5 *mm*, and this was not increased by advancing the levator. The transplanted portion healed smoothly and was of nearly normal thickness. Cilia were indicated by tattooing. The transplanted portion equals in sensibility the corresponding part on the other side. Before the operation there was xerosis of the conjunctiva and cornea. The conjunctiva is still slightly thickened and dry, but the cornea is again lustrous and transparent except for a macula.

ABADIE (273) reports two cases of intermittent hysterical ptosis, one in a patient of forty and the other in a patient of thirteen, brought about by emotional disturbances. Hysterical ptosis is rare, the ptosis usually called hysterical being due to blepharospasm (ptosis pseudo-paralytica). BERGER.

KOSTER (274) found that the instillation of 5 per cent. cocaine solution into an eye with congenital ptosis caused an elevation of the upper lid and a depression of the lower, due to the action of Müller's tarsal muscle. He does not consider the continuous use of cocaine permissible, however.

FRIEDENWALD (275) reports a case of plexiform neuroma of the upper lid, extending slightly to the lower lid and back into the orbit and into the temporal fossa. The conjunctiva of the ball was somewhat thickened, but no diseased nerve fibres were detected there. Most of the diseased tissue was removed and found to consist, as these tumors have always been found to do, of nerve fibres embedded in a framework of connective tissue. The eyelid has the general appearance of elephantiasis. The growth was in a girl, and without doubt congenital. BURNETT.

IX.—LACHRYMAL APPARATUS.

276. **De Bono** and **Frisco.** On the behavior of the lachrymal gland and its secretion toward micro-organisms. *Arch. di Ottalm.*, vii., 5–6.

277. **Silberschmidt.** On two cases of fungous masses in the inferior canaliculus. *Centralbl. f. Bacteriologie*, xxvii., p. 486.

278. **Steinitz.** On the treatment of suppuration of the lachrymal sac with soluble bougies. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 343.

The investigations of DE BONO and FRISCO (276) include four subjects. First, the direct action of the tears upon the staphylococcus aureus, the typhoid bacillus, the cholera bacillus, and the diphtheria bacillus. They used the tears of goats, calves, and

asses. They found that there was a slight diminution of the bacilli, with which the tears were brought into contact, during the first 1–4 hours, after which there was no noticeable change.

In the second series of experiments, rabbits and guinea-pigs were inoculated subcutaneously with a mixture of 3–5 *ccm* tears and cultures of the typhoid bacillus, the staphylococcus aureus, the bacterium coli, the tubercle bacillus, spores of splenic fever bacilli, and finally diphtheria toxin which had been found experimentally to be fatal. All except the animals inoculated with tubercle and splenic fever remained alive. Numerous control experiments led to the conclusion that long contact with the tears weakened the bacterium coli, the typhoid bacillus, and diphtheria toxin; had no effect upon the tubercle bacillus and spores of splenic fever bacilli; and affected slightly the staphylococcus pyogenes aureus.

In the second series of experiments, subcutaneous injections of the splenic fever bacillus, while the lachrymal gland was intact, never led to the appearance of bacilli in the tears even after division of the lachrymal nerve; but after removal of the superior cervical ganglion of the sympathetic they appeared regularly after an interval of thirty hours.

Examination of the lachrymal glands in these animals always revealed the presence of the bacilli that had been injected.

Steinitz (278) passes rods 3 *cm* long and 1 *mm* thick, and containing 1 and 5 per cent. protargol and 1 per cent. silver, into the lachrymal sac. A silver tube is passed through the split canaliculus and the rod of salvé contained in it is pushed out with a silver wire.

X.—ORBIT.

279. **Valude.** Operations on the orbit through the temple. *Bull. de l'Acad. de Méd. de Paris*, May 29, 1900.

280. **Fromaget.** Congenital serous cyst with anophthalmus. *Journ. de méd. de Bordeaux*, iii., 25, 1900.

281. **Lagrange.** Contribution to the study of the dermoid cysts of the orbit. *Ann. d'ocul.*, cxxiii., p. 321.

282. **Schmidt-Rimpler.** Diseases of the frontal sinus. *Deutsche med. Wochenschr.*, 1900 Beilage, p. 84.

283. **Holmes, C. R.** Foreign bodies in the orbit. *Amer. Journ. of Ophth.*, May, 1900.

284. **Suker.** A combination sponge-graft and artificial globe implantation after enucleation of the eyeball. *Ophth. Record*, June, 1900.

285. **Allport.** A case of foreign body passing directly through the eye and

lodging in the posterior portion of the orbit. Dislocation of the lens. Recovery. *Ibid.*, June, 1900.

286. **Ellis, H. B.** Foreign body, piece of a gun lock, embedded in the frontal sinus for six and one half years. Removal. *Ibid.*, May, 1900.

287. **Würdemann.** Unusual complications occurring after an operation for orbital lipoma. *Ibid.*, May, 1900.

288. **Würdemann.** Plastic restoration of the orbit and lids for prothesis. Extensive traumatic ectropion and cicatricial contraction of the orbital tissues cured by Wolff and Thiersch grafts from the skin of the arm and mucous membrane of the lip. *Ibid.*, June, 1900.

VALUDE (279), who made the first radical operations for orbital tumor according to Krönlein's method that were made in France, reports on the satisfactory results thus obtained.

LAGRANGE (281), reports two noteworthy cases of dermoid cyst of the orbit. In one case the cyst had an unusual location, namely, beneath the eye, and from its compression of the ball in the equatorial zone caused an astigmatism of 2.5 D. After the operative removal of the cyst the astigmatism vanished in a few months.

In a second case, suppuration had caused the hair in the dermoid cyst to be cast off completely from its wall. The wall was at some points very vascular, so that microscopically it presented the picture of erectile tissue. At the operation much blood was lost. Following the operation there was a neuroparalytic keratitis, preceded by an iritis, which Lagrange regarded as being of a trophic nature in consequence of injury of the ciliary nerves.

SCHMIDT-RIMPLER (282) states that with a small opening in the bone of the anterior wall of the frontal sinus a thorough scraping of the mucosa may be accomplished if one throws light into the cavity by lens or mirror and thus makes all parts visible.

HOLMES (283) reports three cases of foreign body in the orbit, the eyeball not having been penetrated. In *one* a knife blade 38 *mm* long and 8 *mm* broad remained unsuspected in the lower part of the orbit for thirty-two years with normal vision and perfect movement of the globe. It was discovered in an attempt to find what was supposed to be some necrosed bone. The *second* case was that of a bullet 12 *mm* in diameter which was spontaneously extruded a few days after the receipt of the injury. In the *third* case a large knife was thrust into the orbit and was with difficulty treated. Orbital cellulitis followed and the globe

had to be enucleated. In addition to these he gives the abstracts of sixty-eight other cases of a somewhat similar character which he has been able to collect from the literature of various countries.

BURNETT.

In order to prevent any independent movement on the part of an artificial globe implanted in Tenon's capsule after enucleation, SUKER (284) advises that the globe be enveloped in a thin layer of sponge. The rest of the operation is done in the manner suggested by Lang, Webster Fox, and others. BURNETT.

ALLPORT (285) describes and pictures a case where a piece of steel passed through the eye from the outer canthal side, leaving but little damage behind except a dislocation of the lens. The place of it was plainly seen with the ophthalmoscope. The visual field was contracted, but central vision was $\frac{20}{30}$. The body was located by the X-ray in the posterior part of the orbit.

BURNETT.

In the case reported by ELLIS (286), a man was struck on the forehead by an exploded gun. It was thought to be a superficial injury as the wound healed kindly. Six and one half years after, while searching for some supposed necrosed bone, a piece of gun lock $29 \times 17 \times 11$ *mm* was found firmly embedded in the frontal sinus. Good recovery after removal. BURNETT.

In the case reported by WÜRDEMANN (287), there was a large hematoma of the orbit following an extraction of a lipoma of the orbit. The pressure of this caused a total ophthalmoplegia externa and a partial atrophy of the optic nerve. BURNETT.

In WÜRDEMANN'S (288) case a very severe injury by a penetrating body caused great cicatricial contraction of the orbital tissue and ectropion of the lower lid. The eye was finally enucleated on account of cyclitis. When the man had recovered from this, the tissues of the orbit and lid were loosened from their attachment to the margin of the orbit and the space filled in with a piece of mucous membrane from the lip, a canthoplasty being done at the same time to enlarge the palpebral opening. A lead plate was placed in the orbit to hold the graft in position. A large flap was then taken from the cheek below, remaining attached at the temporal end, and united to the remains of the lower lid, and the space left by this removal was filled by a Thiersch graft from the arm. The healing of the graft was satisfactory and an artificial eye can be worn which much improves the appearance. BURNETT.

XI.—CONJUNCTIVA.

289. **Smit.** An epidemic of conjunctivitis. *Tydschrift voor Geneeskunde*, 1900, No. 26.

290. **Bietti.** On chronic conjunctivitis due to the diplobacillus. *Ann. di Ottalm.*, xxviii., 2.

291. **Hoffmann, R.** On the Koch-Weeks bacillus. *Zeitschr. f. Hyg. u. Infections—Kr.*, xxxiii., p. 109.

292. **Haglund, P.** On the presence of the Weichselbaum diplococcus intracellularis meningitidis. *Upsala Läkare förening Förhandlinger*, vols. v. and vi., 1900.

293. **Baas.** On the anatomy and pathogenesis of pannus and phlyctenulæ. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 417.

294. **Bayer.** A case of ophthalmia nodosa caused by caterpillar hairs. *Münch. med. Wochenschr.*, 1900, p. 780.

295. **v. Michel.** On pemphigus of the conjunctiva. *Zeitschr. f. Augenheilk.*, iii., 6, p. 471.

296. **Fukala.** Two methods of operation to allow the introduction of an artificial eye in cases in which this is not possible. On the artificial eye. *Wien. med. Wochenschr.*, 1900, No. 13.

297. **Weeks.** An operation for the purpose of making the wearing of an artificial eye possible in cases of obliteration of the conjunctival sacs, with reference to two cases. *N. Y. Eye and Ear Inf. Reports*, viii., 1900.

298. **Marple.** Pemphigus of the conjunctiva. *Ibid.*

After SMIT (289) in 1899 had observed a case of conjunctivitis in the secretion of which he found the Pfeiffer influenza bacillus, he saw in the influenza epidemic of this year twelve cases of conjunctivitis in which besides staphylococci and other micro-organisms he found a bacillus which was very similar to the Pfeiffer bacillus and corresponded exactly to the Koch-Weeks bacillus.

Smit now asks whether there is sufficient difference between the two to justify us in believing them to represent two different varieties. JITTA.

BIETTI (290) found diplococci in thirty-four cases of acute conjunctivitis. These appeared not only in the cultures of the secretion but except in one case they were visible in the secretion itself.

HOFFMANN (291) comes to the following conclusions: The Koch-Weeks bacillus causes a very contagious inflammation of the conjunctiva, which not infrequently is croupous and leads to a chronic papillary hypertrophy. The bacilli may lie a long time among these papillæ and communicate the disease to others.

In an infant of five months, with a severe conjunctivitis which later led to destruction of the cornea and phthisis bulbi,

HAGLUND (292) found a micro-organism, which he regarded as the Weichselbaum diplococcus intracellularis meningitidis. DALÉN.

BAYER (294) describes how the caterpillar hairs are mostly driven into the eye by the patient's rubbing. Furthermore, sharp and stiff portions of the hair may be forced even deeper by the movements of the lid and accommodative processes. Whether the irritation they cause is only mechanical or is chemical, has not yet been determined. When in fresh cases the hairs cannot be washed out or removed with forceps, active measures are abstained from and rest is enjoined. In Bayer's case Eversbusch punctured the anterior chamber. There was at once considerable hemorrhage from the iris, which seemed to have a salutary effect, for the eye which had exhibited a severe iritis recovered completely.

There are four sorts of pemphigus: neonatorum, acutus, foliaceus, and vulgaris, according to v. MICHEL (295), but in the eye only the conjunctiva is ever attacked. Pemphigus may attack the conjunctiva alone or other mucous membranes or the skin may be involved also. The vesicles are rarely seen on the conjunctiva, perhaps because the epithelium is so thin; but at the inflamed spots there are grayish-yellow or white exudative membranes of various sizes and irregular margins. The two points of predilection are first the inner canthus, and second the lower portion of the scleral conjunctiva half way between the corneal margin and the retrotarsal fold. Pemphigus of the conjunctiva may disappear without leaving a trace, and repeated eruptions at a given point are required in order that adhesions shall result.

For obliteration of the conjunctival sac the plastic operation done by WEEKS (297) consists in a free dissection of the lids from the orbital tissue and the implanting of a Wolff graft, which he keeps in place by sutures and a shell or plate. The cul-de-sac of the graft is kept in place by sutures which pass through it and out at the orbital edge, bringing the raw surface of the graft in contact with the periosteum if possible. The lids are operated upon at different sittings. He prefers a shell made of ordinary rubber tissue. BURNETT.

MARPLE (298) reports and figures a typical case of chronic essential shrinking of the conjunctiva in a man of sixty-five, due no doubt to pemphigus. It follows the usual history of resisting all efforts at stopping its progress, except that in one eye he succeeded in making a Thiersch graft in the lower cul-de-sac which has remained without any marked shrinking for a year. BURNETT.

(*To be continued.*)

BOOK NOTICES.

I.—**Original Contributions Concerning the Glandular Structures Appertaining to the Human Eye and its Appendages.** With 77 original illustrations. By ADOLF ALT, M.D., Professor of Ophthalmology in Beaumont Hospital Medical College, St. Louis. *American Journal of Ophthalmology*. Published, St. Louis, Mo., 1900. Price $1.50.

The text-book descriptions of the glands of the ocular apparatus being confusing and contradictory, Alt has worked over the entire subject anew with the idea of gaining a clearer conception of these structures. His monograph consists of 23 pages of descriptive text and 35 pages of for the most part very successful photomicrographs taken by himself from his own preparations. He describes the orbital and palpebral lachrymal glands, the palpebral Meibomian, acino-tubular, and modified sweat glands, and the glands of the lachrymal drainage apparatus, as he found them in his preparations.

Unfortunately, some slight gaps mar the completeness of the work, and some moot questions are not settled, which is to be regretted in so excellent a monograph, for the author apparently had the opportunity, by doing a little more labor, of writing a complete and authoritative treatise on the subject, in which the last word might have been said. W. A. H.

II.—**A Handbook of the Diseases of the Eye and their Treatment.** By HENRY R. SWANZY, A.M., M.B., F. R. C. S. I., Examiner in Ophthalmology to the University of Dublin, etc.

Seventh edition, with 165 illustrations, small octavo, pp. 607. Philadelphia, 1900, P. Blakiston's Son & Co. Price $2.50.

A student's text-book of ophthalmology that has reached its seventh edition needs no analysis in these pages, and one need only say that the last edition of this deservedly popular book has been brought quite up to date. W. A. H.

III.—**Die Functions Krankheiten des Auges.** Second part. The Course and Prevention of Diseases of the Retina, Choroid, and the Ciliary Muscle. By Prof. WILHELM SCHOEN, Leipsic. Wiesbaden, 1901, J. F. Bergmann. Octavo, pp. 220, with 37 plates. Price 20 marks.

Professor Schoen here presents a continuation of his earlier studies on the region of the ora serrata, particularly with reference to distortion and degeneration of the tissues of this region from traction of the zonula fibres in states of accommodative strain and spasm.

He reports the microscopic examination of this region in many eyes whose clinical history had been followed; and he endeavors to convince the reader by vigorous statement, ingenious argument, and thirty-seven pages of photomicrographic reproduction, that accommodative strain, through the changes which it produces at the ora serrata, is the cause of serous iritis, chorio-retinitis of many sorts, and glaucoma. Possibly he would be more convincing were he less aggressively positive. This book, the author states, is not for such as pin their faith to dogmas and authorities, and he has no hope of converting them. He boldly attacks his former critics and quotes for their benefit page-long extracts from books on logic; yet his own arguments do not always seem faultless and there is sometimes a long jump from his premises to his conclusion. However, the book shows evidence of no little research in a field as yet not much worked over, and it brings out many points of value which are deserving of further critical study by some one that may separate the wheat from the abundant chaff. W. A. H.

MISCELLANEOUS NOTES.

Nov. 29, 1900, a new ophthalmic hospital was opened at Moscow, which was founded and endowed by Mrs. Barbara Alexcewa, and transferred to the municipality. It consists of a hospital department of fifty-four beds and a well equipped dispensary. The surgeon in charge is Dr. C. ADELHAIM.

An ophthalmic hospital with thirty-two beds and appropriate rooms for out-patients was opened in Karlsruhe, Sept. 15, 1900, under the direction of Dr. TH. GELPKE.

Dr. JOHN E. WEEKS has been appointed Professor of Ophthalmology at the University and Bellevue Hospital Medical College.

Dr. C. ADDARIO, has been appointed privatdocent in ophthalmology at Naples.

Obituary.[1]

Dr. Henry D. Noyes was born in New York City in the year 1831; he died Nov. 12, 1900. He was graduated at the Academic Department of the New York University in 1851, then in the College of Physicians and Surgeons of New York in 1855. He immediately entered the New York Hospital as Interne, where he finished the regular term of two years. Then he went to Europe for further studies, paying particular attention to ophthalmology. After his return he settled in New York to practise eye and ear surgery. He was appointed Assistant Surgeon at the N. Y. Eye and Ear Infirmary. In 1864 he was made a surgeon. From 1875 to 1898 he was Executive Surgeon at the Infirmary. For many years he was professor of ophthalmology and otology in Bellevue Hospital Medical College.

He was a man of rare talent, had a broad general as well as medical education, was an excellent speaker and writer in English, had a useful conversational and a good reading acquaintance with French and German.

Dr. Noyes was a graceful and forcible orator and writer, a keen observer, utilizing what he read and saw with a bias to improve on it; he was an excellent operator, with a well trained hand and a resourceful mind. Many were his contributions to the theory and practice of ophthalmology, and they were as interesting and instructive as they were numerous. His text-book on *Diseases of the Eye*, of which two editions have appeared, is one of the best, exhaustive and yet concise, a testimony of most extensive personal experience and conscientious use of literature. His style is easy and elegant. His text-book is the representative American text-book of ophthalmology of the present time.

[1] Read before the Section of Ophthalmology at the New York Academy of Medicine Dec. 17, 1900, by Dr. H. Knapp.

One of the greatest merits of Dr. Noyes's career is the *development of the N. Y. Eye and Ear Infirmary*, the oldest, largest, best equipped of all American ophthalmic and aural hospitals, and one of the greatest in the world. He gave to it his thought, time, knowledge, experience, and labor. Let me finish with transcribing a part of what his successor, the present Executive Surgeon, Dr. R. H. Derby, wrote on this subject: "In 1859 the Institution was an Eye Infirmary, whose medical staff consisted of 9 men, now there are 83, to do justice to the three departments of the eye, ear, and throat. The well ordered hospital of to-day, with its superintendent and clerks, its isolated cataract wards and pavilion for contagious ophthalmia, its training-school for nurses, its school of instruction for graduates in medicine, its annual volume of scientific transactions, its valuable medical library, owes in no small way its pre-eminence to the wise forethought and ceaseless activity of Dr. Noyes."

Honor to his memory!

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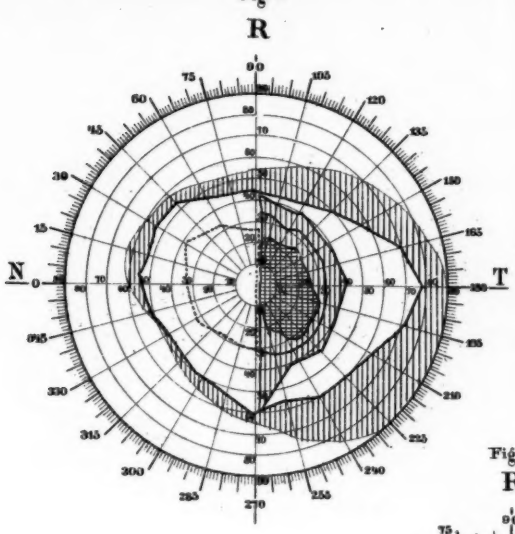

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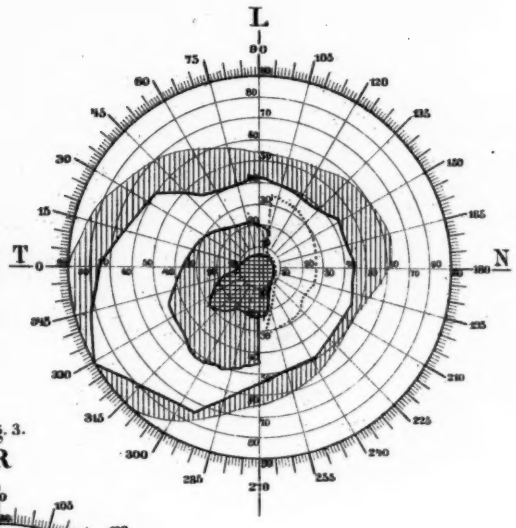

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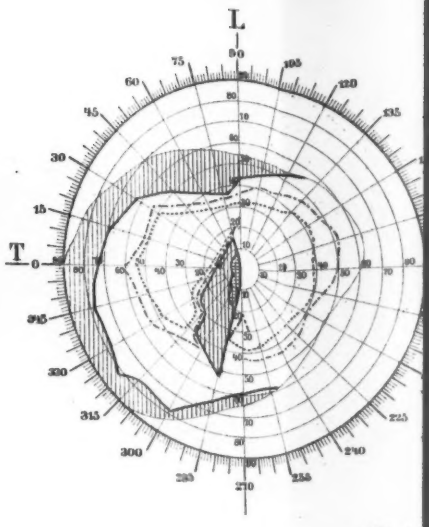

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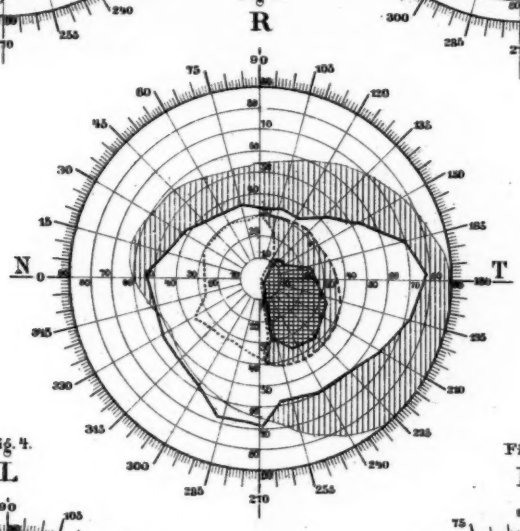

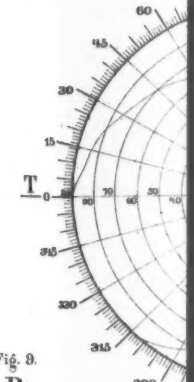

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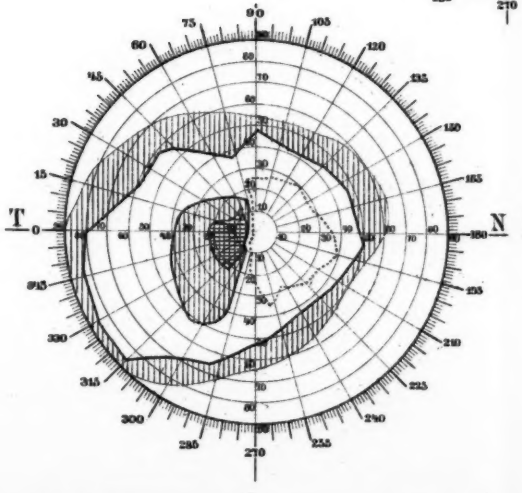

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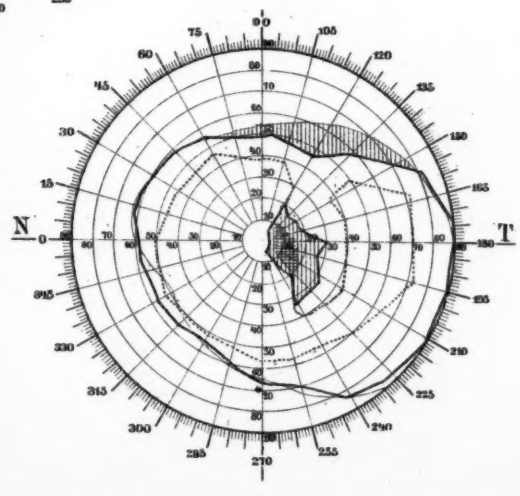

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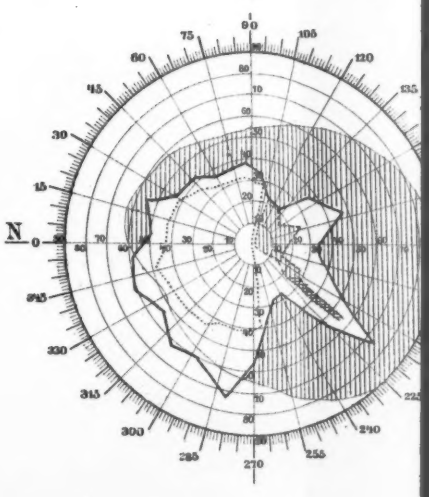

Kgl. Univers.-Druckerei v. H. Stürtz, Würzburg.

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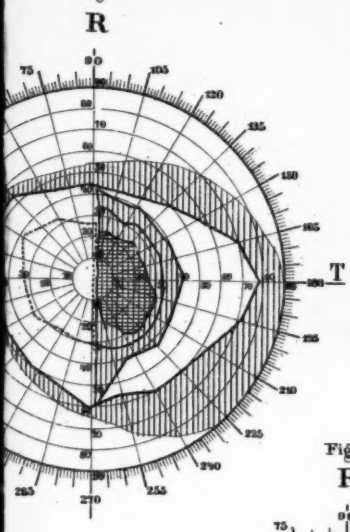

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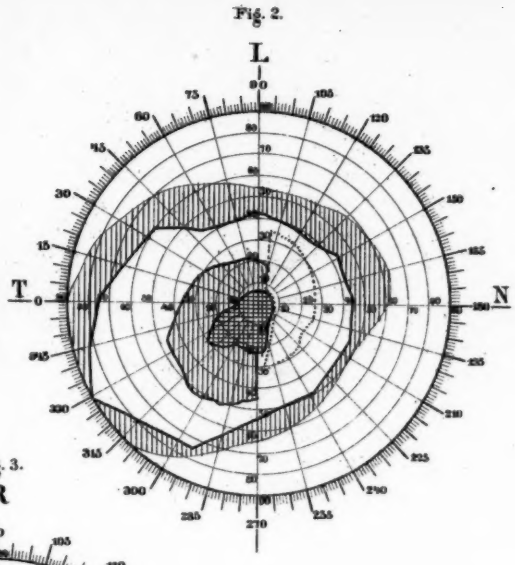

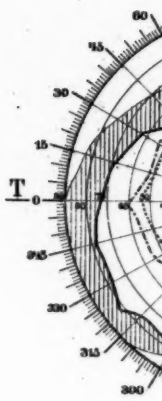

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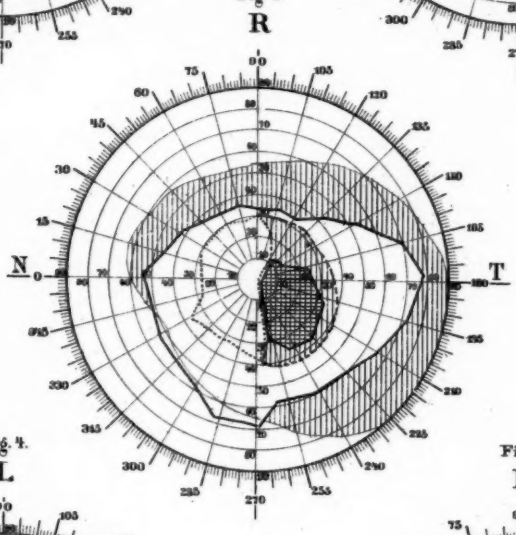

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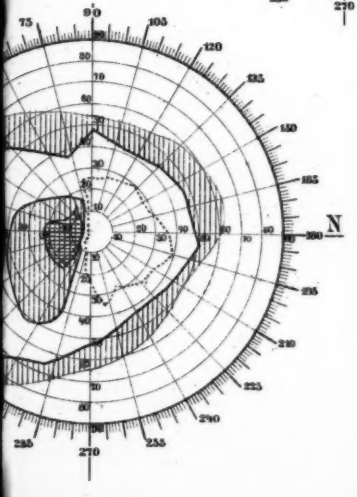

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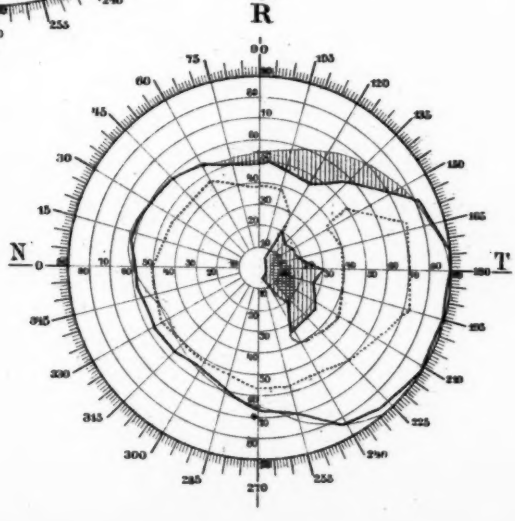

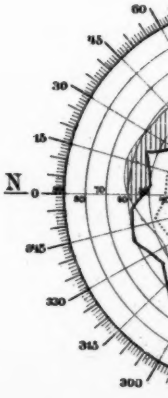

k. H. Stürtz, Würzburg.

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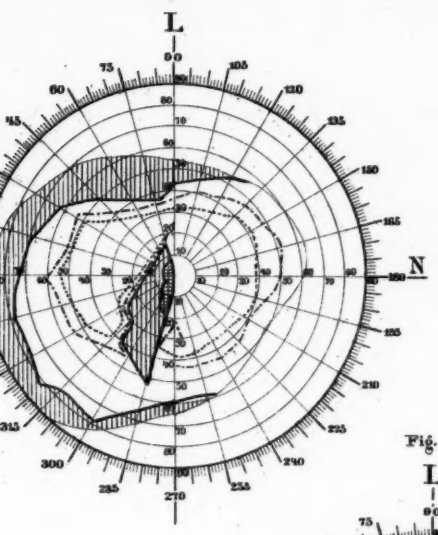

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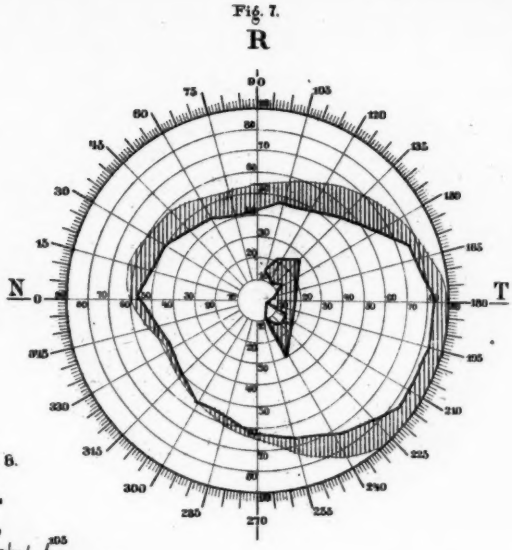

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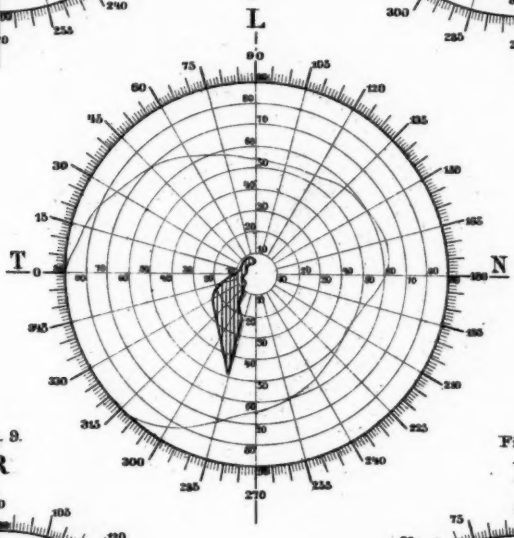

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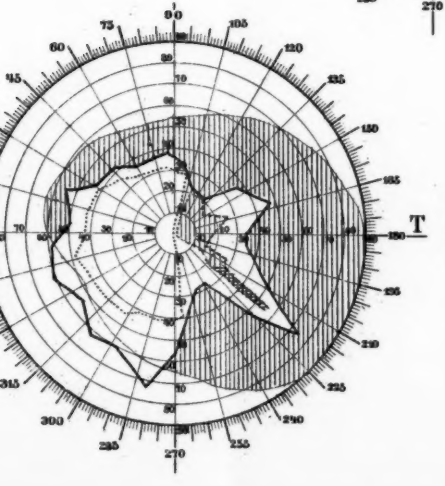

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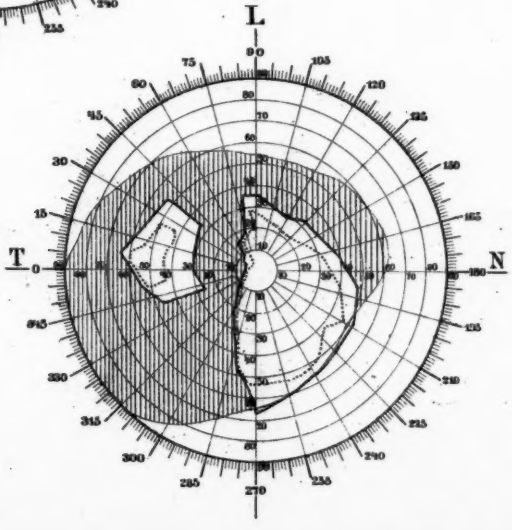

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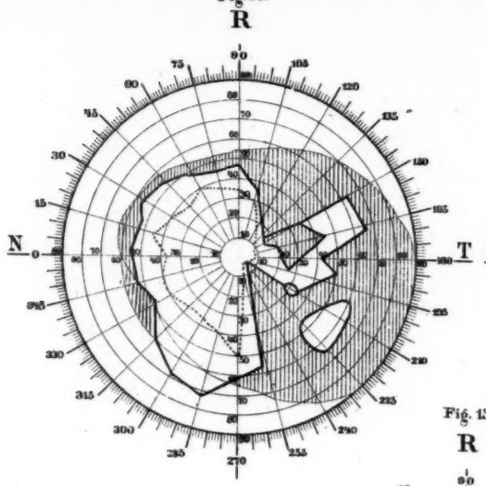

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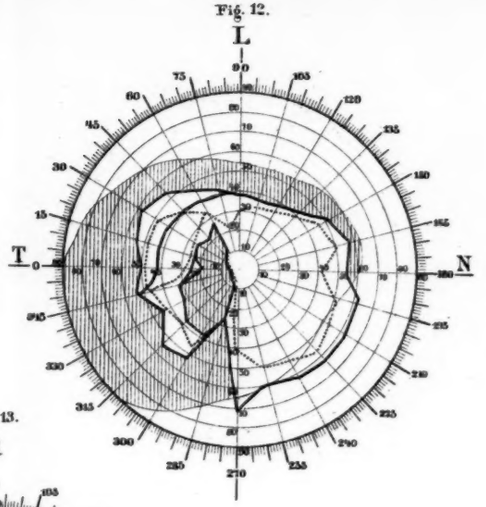

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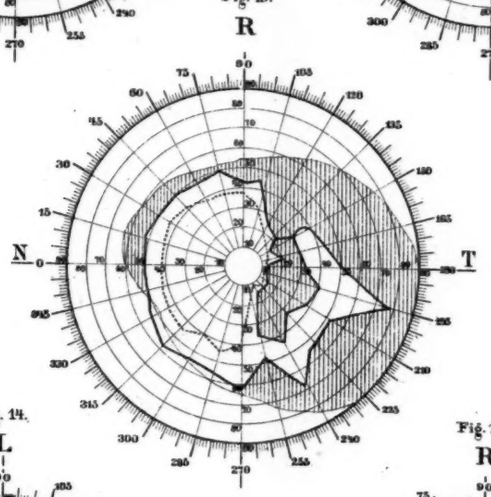

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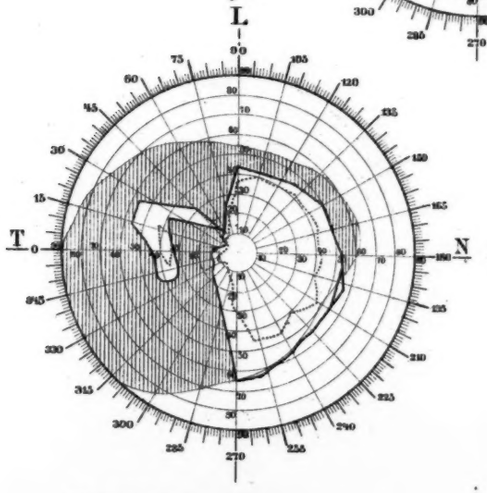

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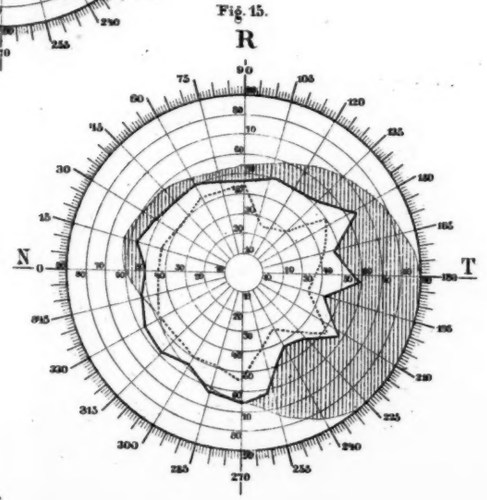

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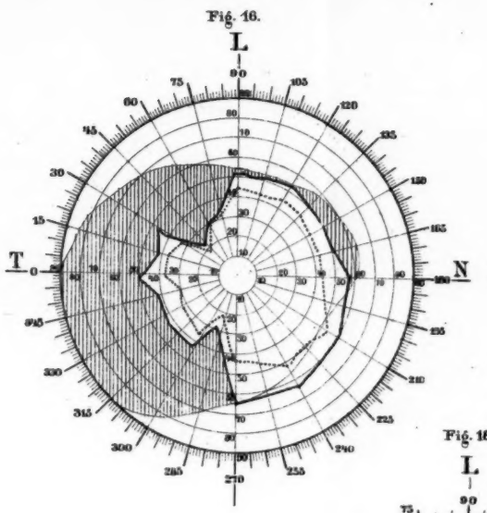

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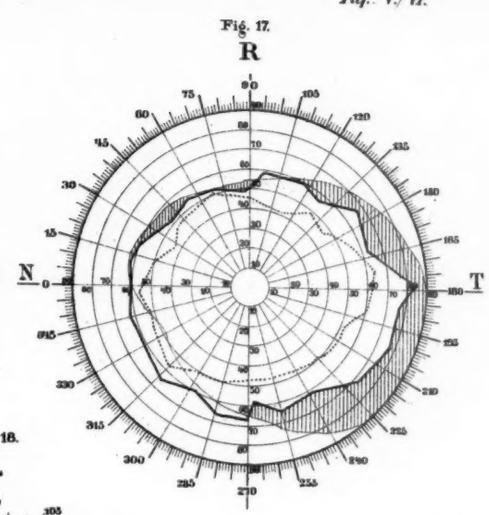

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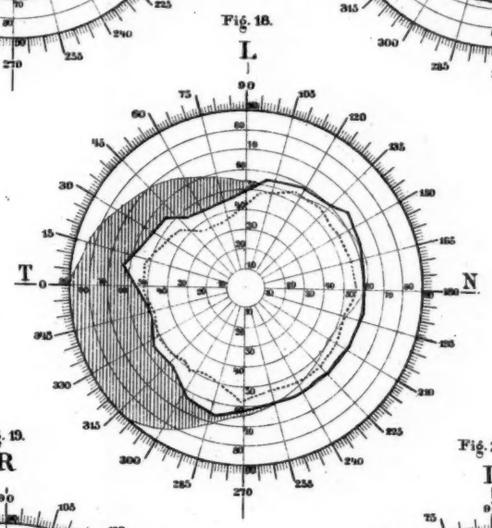

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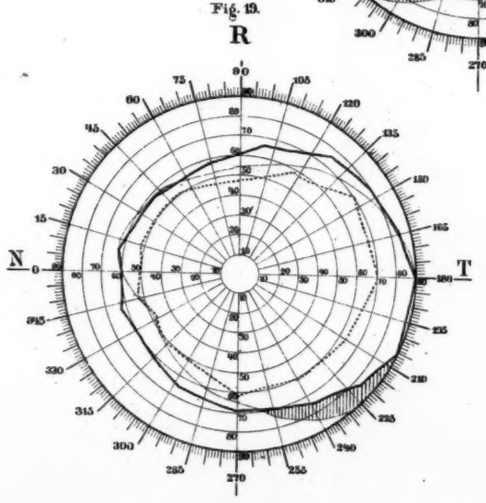

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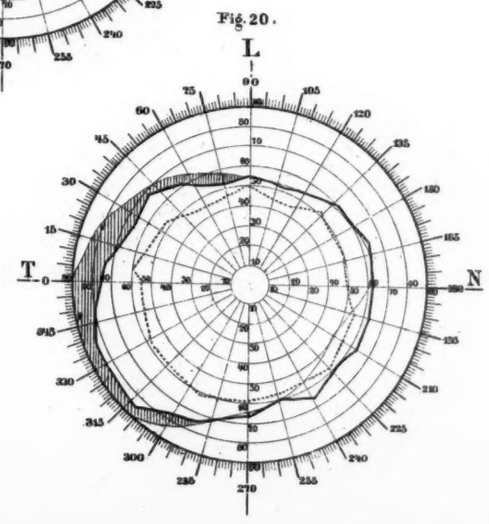

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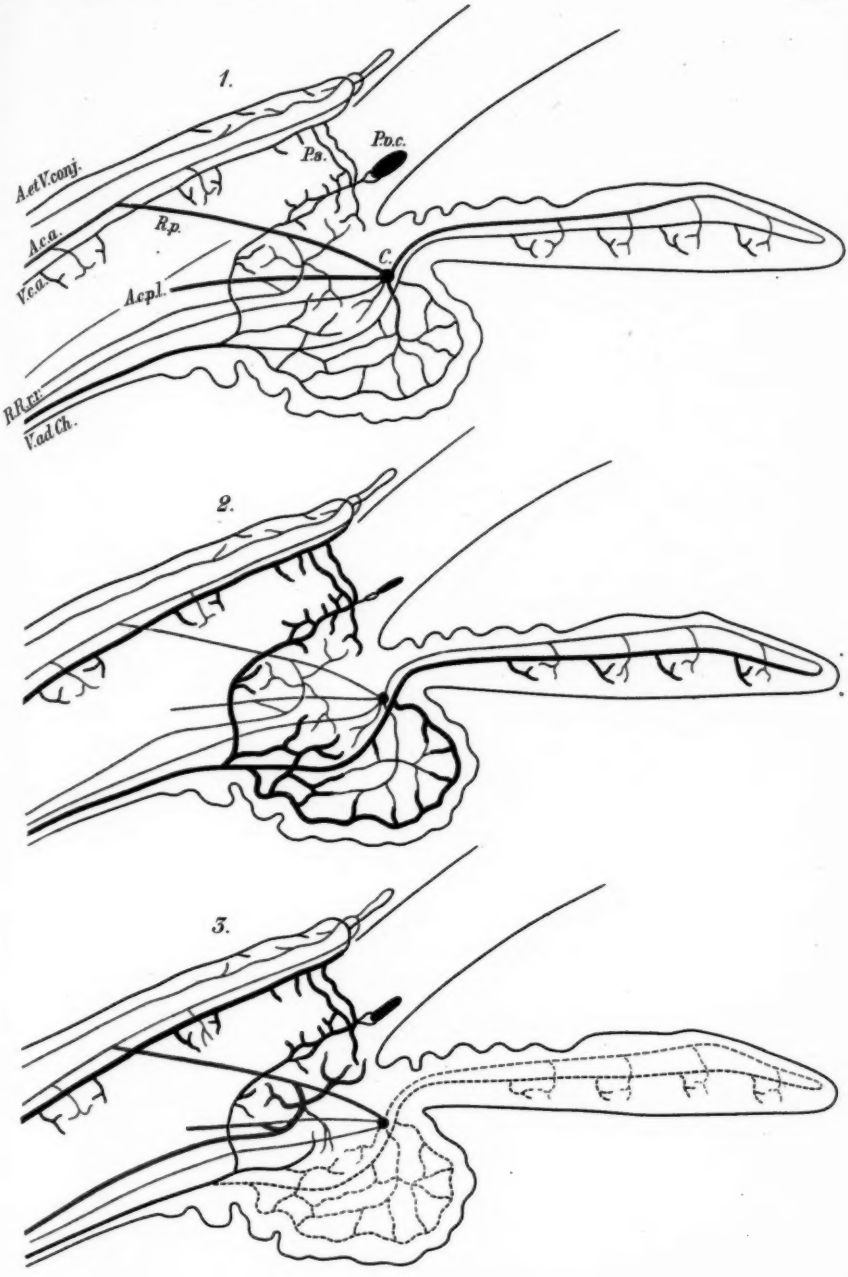

Dr G. Jschreyt del. Verlag v. J.F.Bergmann, Wiesbaden. Lith. Anst. v. H. Jonas, Cassel.